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TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

Volume 12 (Fourth Series)

Number 1 (April 1944)

A Study of the Incidence of the Commoner Types of Anemia, Their Cause and Treatment*

By CYRUS C. STURGIS, M.D.

Professor of Medicine, University of Michigan

INTRODUCTION

IT IS generally accepted that anemia of one kind or another, is undoubtedly one of the most common causes of symptoms encountered in the practice of medicine. It should be of interest, therefore, to present some studies which were designed to answer the following questions:

1. At what level does a decrease in the hemoglobin of the circulating blood become clinically significant?

2. What is the incidence and the type of anemia most frequently encountered in persons whose complaints are such as to cause them to seek medical attention?

Before proceeding further with my remarks concerning anemia, permit me to digress briefly in order to describe the method of study which we have applied in recent years to all in-patients and out-patients who registered at the University Hospital of the University of Michigan. This has enabled us to collect information of various types, including the incidence of anemia, in a large number of patients.

Our hospital which has a bed capacity of 1200 and 85,000 visits to the out-patient department annually, has 15 different medical and surgical departments to which patients may be admitted directly. When such a system is in force, which it is in almost all large hospitals, it means that a patient not infrequently will have only a certain part of his body examined, as he may be seen by a physician whose attention is directed solely to those areas of the body which he regards as his special field. It has become impressed upon many of us, especially in more recent years, that with the amazing growth of highly developed specialism, which should continue to thrive for there is much to be said in its favor, it becomes necessary to institute certain measures to protect patients against some of its shortcomings. Let me state emphatically that in my opinion it is desirable for specialism in medicine to remain with us, for it permits a physician to attain a high degree of perfection in certain subdivisions of medicine which could not otherwise be accomplished. But its dangers must be kept in mind constantly and dealt with effectively if our objective is to provide the best possible medical care for all of our patients. My plea, therefore, is to confess frankly that a physician cannot take care of parts of patients, and to attempt to do so is fraught with certain risks from which the patient should be protected.

In an effort to circumvent errors at the University Hospital during the present emergency, a

* From The Thomas Henry Simpson Memorial Institute for Medical Research, University of Michigan. Delivered at a joint meeting of the College of Physicians of Philadelphia and the Philadelphia County Medical Society, January 12, 1944.

minimum number of diagnostic procedures are required on all patients. Some have been employed for a long period of time, others, such as the blood survey, have been added during the past year. The latter, we believe, is adequate to determine if an anemia is present, and if so, to give some idea as to its nature.

The procedures which are employed routinely are as follows: 1. The serological test for syphilis; 2. Chest microfluorograms; 3. Blood examination, which consists of hemoglobin and hematocrit determinations with calculation of the mean corpuscular hemoglobin concentration and saturation index; 4. Determination of the temperature, pulse and respiration.

In addition, in the medical department, all patients have the height, body weight and blood pressure recorded, and the urine examined. It is hoped that soon these latter procedures will be required of all patients in other departments.

Permit me first to mention briefly the results of the tests other than those designed to determine the presence or absence of anemia.

The Serological Test for Syphilis. Although only approximately 2 per cent of our patients have a positive serological reaction for syphilis (the Kahn test is employed), it is regarded as one of the most important procedures which we use, because not only does it provide positive information which often could not be obtained in any other way, but it is also invaluable as a method of providing highly significant negative evidence. It is appreciated that one cannot practice medicine today without accumulating an abundance of such negative evidence, in almost every patient.

The Routine Use of Chest Microfluorograms. In 1936 Dr. F. J. Hodges, the chairman of our Roentgen Ray Department, obtained 1101 anteroposterior roentgenograms on all patients registering at the hospital in 12.5 working days. The results of this brief survey were so striking that shortly thereafter this was instituted as a required procedure which was accomplished by securing microfluorograms of patients who were admitted as bed patients to the hospital, as well as those coming to the out-patient department. In the initial survey, it was found that in 68 per cent of all patients, there were no significant changes in the chest films, possibly significant changes were present in 24 per cent, and undoubtedly important ones in 8 per cent. Details need not be discussed, but I should like to state that some important diagnostic errors were detected by the roentgen ray in patients who came to the hospital for examination but in whom the attending physician did not consider a chest film necessary. The chest film, therefore, in an appreciable number of instances, disclosed clinically significant lesions which had not been suspected by the physician in charge. We were so impressed by the results of the preliminary survey that microfluorograms of the thorax have been required of all patients since that time.

THE BLOOD SURVEY

Over a year ago, it was decided to institute a blood survey to determine the incidence and nature of anemia in all patients who presented themselves for examination at the University Hospital. For a test period of two weeks, all patients admitted to the in-patient and out-patient departments, had the following tests:

1. The hemoglobin estimation by means of the Klett-Summerson photo-electric hemoglobinometer, standardized by the Van Slyke oxygen capacity method, so that 100 per cent is equivalent to 15.6 grams per 100 c.c.

2. A determination of the sedimentation rate per hour by the use of the Wintrobe hematocrit tube.

3. Estimation of the hematocrit reading by centrifugation of the oxalated blood in the same tube.

4. Calculation of the mean corpuscular hemoglobin concentration by means of the hemoglobin and hematocrit readings, and expression of the results in terms of normal by employing the saturation index.

Such tests give valuable and accurate information as follows: The hemoglobin determination by this highly satisfactory technic, indicates very definitely the presence or absence of anemia. The mean corpuscular hemoglobin concentration, and the saturation index enables one to distinguish accurately between the hypochromic anemias, on the one hand, and the normochromic, or "hyperchromic" anemias on the other, as it provides comparable but more accurate information than the color index.

From this survey, it was determined that approximately 24 per cent of the 734 persons examined had an anemia which was clinically significant. These figures convinced us that a blood study to determine the presence or absence of anemia was

important, and that it should be instituted as a part of the routine study of all patients who registered at the hospital. Such a study was begun in November, 1942, and has not yet been fully completed. Observations were made on the blood of approximately 25,000 patients during a period of one year, but we have statistical information concerning observations on slightly more than 11,000 persons who were examined during the first 6 months. Furthermore, although our conclusions are based on the studies made on the patients who were seen during the first half of the year, we have sufficient data from the group observed during the latter 6 months which indicates that the findings will be essentially in accord with those of the former group.

Observations on patients under 14 years of age are not included in this report, as their standards for normal differ from those of adults, and hence will be made the subject of a special report.

The Normal Hemoglobin Level. A study of the blood of adults of both sexes, in the past few years, has convinced us that the lower limit of normal of the hemoglobin of the circulating blood for adult males is 84 per cent (13.1 grams per 100 c.c.), and for adult females 78 per cent (12.2 grams per 100 c.c.). Levels below these arbitrarily selected limits of normal are regarded as representing anemias that are clinically significant.

The Incidence of Anemia. Table I indicates an incidence of anemia in 12.4 per cent of all of the 11,113 patients examined. It also shows that the anemia occurred with about the same frequency in both sexes, a fact that was somewhat surprising to me, as it had been anticipated that the incidence would be greater in the female sex. It should be emphasized, however, that the figures cited represent the frequency of anemia in persons who have symptoms of such severity that they seek medical attention for relief. I do not doubt that if the prevalence of anemia were determined in large representative groups of our population, it would be greatest in females on account of pregnancy and lactation and excessive loss of menstrual blood.

The other figures in Table I are self-evident. They indicate, as is to be expected, that the greatest percentage of patients have a slight anemia, as represented by a hemoglobin which is not less than 79 per cent in males, and 71 per cent in females. The remaining degrees of anemia, totaling 5.5 per cent of all patients, show no important difference in incidence in males and females.

Chart I depicts the types of anemia as indicated by the variations in the mean corpuscular hemoglobin concentration and the saturation index. This gives the same but more readily obtained information as that provided by the color index, for it is derived by dividing the hemoglobin content of the blood in grams by the hematocrit reading, and hence, it is not necessary to do a red blood cell count.

From the data furnished by this chart, it is apparent that all of the anemias may be divided into 3 main groups, as follows:

1. Hypochromic anemia which was present in 41 per cent of the patients, if the mild type (16.8 per cent) and the moderate to severe group (24.26 per cent) are included together. This group is made up entirely of anemias due to iron deficiency.

2. The mild normochromic anemia, or simple chronic anemia due almost entirely to chronic infection.

3. The moderate to severe normochromic anemias which include the more pronounced anemias due to infection, the anemia of nephritis, myelophthisic anemia, pernicious anemia, the hemolytic anemias, aplastic anemia, some anemias of pregnancy and acute post-hemorrhagic anemia.

TABLE I

	Number of Patients	Total with Anemia	Slight M 84–79 F 77–71	Moderate M 78–72 F 70–65	Moderately Severe M 71–66 F 64–58	Severe M, below 66 F, below 58
		per cent				
Male.....	5,664	12.5	6.2	2.6	1.6	2.2
Female.....	5,469	12.3	7.8	2.2	0.8	1.5
Total.....	11,133	12.4	7.0	2.4	1.2	1.9

The figures following the letters, M (male), and F (female), indicate in per cent the various hemoglobin levels arbitrarily selected as representing the different degrees of anemia. In this Table, and throughout the article, 100 per cent is equal to 15.6 grams of hemoglobin.

SIMPLE CHRONIC ANEMIA

The greatest single group of patients had a normochromic anemia as indicated by a mean corpuscular hemoglobin concentration of 30 per cent or more, and a saturation index of 0.90 or higher.

These may be divided into the mild group in which, in males, the hemoglobin reading did not fall below 79 per cent, and in females in which it was not lower than 71 per cent. Thirty-nine per cent of all patients had an anemia of this kind which is normochromic and also normocytic; rarely was there significant anisocytosis or poikilocytosis present. It has been designated as a simple chronic anemia, —simple because the changes in the red blood cells are not very marked, and chronic because it usually exists for a considerable period of time, and is not very amenable to treatment.

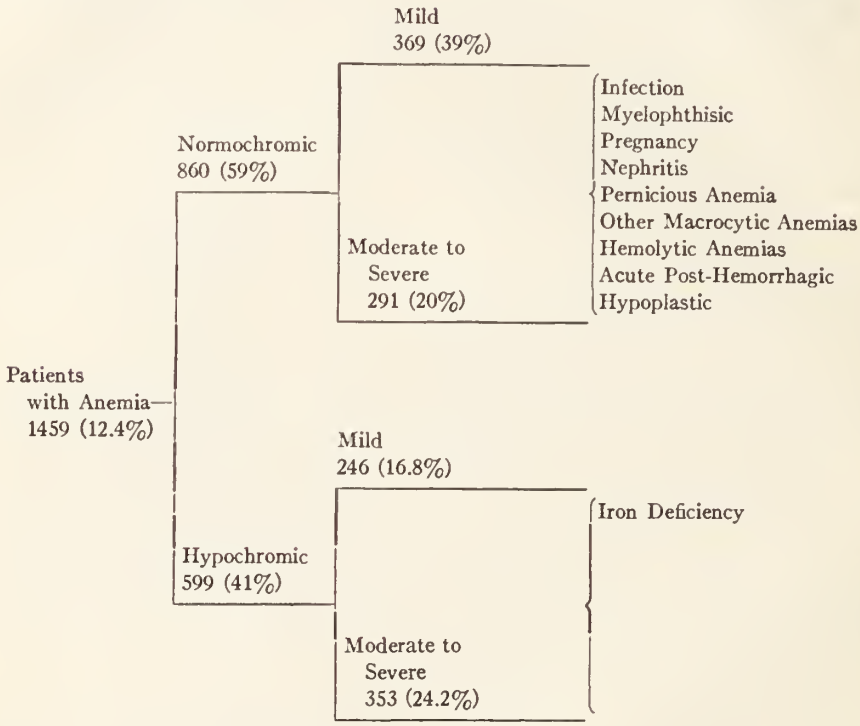

Chart I. Showing the Severity and Types of Anemia

The term simple chronic anemia is not a satisfactory one in some respects because it originally included a group of anemias which were due to many diverse and wholly unrelated causes. On the other hand, it is useful to designate a type of anemia, such as described above which is usually mild, and one characterized by its chronicity and the fact that the changes in the blood are not very striking. In my opinion, if many of the anemias which were originally included in this group were excluded, such as myelophthisic anemia, the anemia of Addison's disease, and myxedema, and the anemias of pregnancy, and others due to well recognized and important causes, then 95 per cent of the anemias left in the simple chronic anemia group would be due to infection of one kind or another, and a relatively small group which is due to nephritis with nitrogen retention in the blood stream.

The types of infection which are of the most importance in the causation of simple chronic anemias are as follows: urinary infection, either with or without obstruction due to enlargement of the prostate gland; pelvic infection in women; chronic pulmonary infection such as bronchiectasis, chronic empyema, and lung abscess; rheumatoid arthritis and rheumatic fever; brucellosis; streptococcus viridans infection; and many others. It has not been my experience that the so-called focal infection about the teeth and tonsils or elsewhere, are important in the etiology of this type of anemia.

The work of Robscheit-Robbins and Whipple (1), Vaughan and Saifi (2), and Willison (3) indicates that the anemia of infection is not ordinarily due to increased hemolysis but that the formation

of hemoglobin is affected primarily and, therefore, the formation of red blood cells indirectly. The deleterious effect of infection on the formation of hemoglobin and red blood cells is observed when it occurs in such conditions as pernicious anemia and iron deficiency anemia during the course of treatment with iron or antipernicious anemia medication, for it prevents the formation of hemoglobin and red blood cells at the rate which one would ordinarily expect in such patients.

This form of anemia may be associated with chronic glomerular nephritis, and in prostatic obstruction, following surgical removal of the remaining functioning kidney, and in congenital polycystic kidneys. In all of such conditions, there is a retention of nitrogenous products in the circulating blood. The exact cause of the anemia is unknown, but in my opinion the chronic acidosis which is always associated should be carefully investigated as a possible etiological factor in this condition.

IRON DEFICIENCY ANEMIA

As previously stated, this type made up 41 per cent of all the anemias that were observed in our group of patients, and of these 16.8 per cent were mild, and 24.2 per cent were moderate to severe in degree. The condition may be defined as a microcytic, hypochromic anemia due to an inadequate supply of iron in the body for the formation of a normal amount of hemoglobin. This variety of anemia is of great importance because it is common and because it responds in a gratifying manner to iron medication. At the present time, it is also of interest because it is probably the predominating variety of anemia observed in the areas occupied by the Axis powers in which there is a curtailment of food.

It is now recognized that the nutritional anemia in infancy and childhood, chlorosis or the hypochromic anemia of adolescent girls, the hypochromic anemia of pregnancy, the anemia of chronic blood loss, and the so-called idiopathic hypochromic of adult women, are all due to a deficiency of iron in the body. Furthermore, it should be emphasized that practically all hypochromic anemias, with the exception of Mediterranean or Cooley's anemia, are due to a deficiency of iron. The least that can be said is that when one encounters such an anemia, iron therapy deserves a trial in the confident hope that the condition will be benefited.

The Metabolism of Iron. Before discussing the causes of the iron deficiency anemias, a brief review of our present day views concerning the metabolism of this important metal in the body may be given as follows. Iron in its ferric form is taken in with the food in amounts averaging between 12 and 16 milligrams daily in the average person in this country. Two important actions occur (4) in the stomach which are due essentially to the presence of free hydrochloric acid. These are (1) rendering the metal soluble and ionizing it, and (2) preventing the formation of insoluble iron compounds such as iron phosphate. The iron then passes into the upper intestinal tract where it is apparently reduced into the form of ferrous salts and is absorbed as such. It is likely that iron with this valency only is absorbed.

In recent years it has been demonstrated by Hahn and Whipple (5) that apparently the epithelium of the mucosa of the upper intestinal tract has the ability to accept or reject iron for absorption, depending upon the immediate requirements of the body. Ordinarily the normal adult, especially the male, has need for the daily absorption of only small amounts of the metal, because normally almost negligible quantities are lost from the body. Consequently, although 12 to 16 milligrams are taken in the diet each day, only a very minor fraction is absorbed because usually the normal adult is well supplied with iron reserves. On the other hand, if a hemorrhage should occur, or a need for iron is created for some other reason, then the intestinal mucosa functions to absorb a much larger amount of iron. It can be said, therefore, that the iron which is ingested by the patient usually passes through the intestinal tract instead of being absorbed and then excreted, as some had previously thought. Furthermore, it has been demonstrated (6) that once iron enters the body it normally does not leave except in the menstrual flow, in the formation of the fetus and the placenta, in the milk, and in exceedingly small amounts in the bile and the urine. When this is taken into account, it is plausible to surmise that the injection of iron in the form of a large number of blood transfusions, may be responsible for the development of hemachromatosis due to the large amount of iron which is retained by the tissues.

The total amount of iron in the body averages about 4.2 grams, of which between 60 to 70 per cent is found in the hemoglobin of the circulating

blood where it occurs in a percentage of 0.344. There is a reserve iron supply of about 0.3 grams which is stored chiefly in the liver, the spleen, bone marrow, and other organs throughout the body. It is calculated that this is sufficient to provide for the regeneration of between 600 to 800 c.c. of blood. The remainder of the body iron is found in all tissues where it performs an important function, probably in relation to tissue metabolism. This tissue iron is not available, however, for the formation of hemoglobin.

In one patient with idiopathic aplastic anemia who was observed at the Simpson Memorial Institute, 137 blood transfusions were given in a period of slightly over 8 years. During this time, 68,500 c.c. of blood were injected which contained an estimated 36.3 grams of iron. In the latter months of the patient's life, he developed the characteristic color of hemachromatosis, a glycosuria, and cardiac disturbances which were finally responsible for his death. At necropsy there was a deposition of a large amount of iron found in the skin, the liver, pancreas, myocardium and various other tissues in the body. Hemachromatosis as a complication of aplastic anemia has previously been recognized, but all are not in accord with the view that it follows repeated blood transfusions with the resultant deposition of an excess of iron in the body tissues. To me, however, it appears to be the most likely explanation.

Causes of Iron Deficiency. The causes of a deficiency of iron need not be discussed at length, as they are well known. Such a deficiency may arise from (1) a decreased intake, (2) impaired absorption, which may be associated with an achlorhydria or chronic diarrhea, (3) increased needs such as those arising from growth, menstruation, pregnancy and lactation, and (4) chronic blood loss. It is my opinion that the only cause of those mentioned above which is capable of producing an anemia when acting alone, is chronic hemorrhage. The others may contribute to the severity of an anemia, but two or more must be active before an anemia results.

Chronic hemorrhage is undoubtedly the most frequent cause of an iron deficiency anemia. In males, the bleeding is usually from the gastrointestinal tract, and it is most commonly due to hemorrhoids, peptic ulcer or to carcinoma of the stomach. Other important causes are esophageal varices, chronic ulcerative colitis, carcinoma of the caecum, the sigmoid or the rectum. In females, bleeding from the gastro-intestinal tract is also many times the cause for anemia but it is surpassed in importance by uterine bleeding.

The bleeding, regardless of its source, in either males or females, is commonly in the form of small unnoticed quantities of blood, and consequently the patient frequently is unaware that chronic hemorrhage is present. This is especially true in an excessive menstrual loss. It has been found by Barer and Fowler (7) that the normal woman loses an average of about 50 c.c. of blood at each period which means an iron loss of 19.7 milligrams. They also observed that neither the duration of the period or the number of napkins used were reliable criteria of the amount of blood lost, although they do give some indication. The loss of as much blood as 179 c.c. per period which was regarded as normal by one of their subjects, would require a daily positive iron balance of 3.29 milligrams for each day of the 24-day cycle. According to these authors, this is more than is ordinarily stored, and it could be gained only by the addition of iron to that obtained in the diet. It should be emphasized, therefore, that the excessive loss of menstrual blood undoubtedly plays an important and frequently unrecognized role in the causation of iron deficiency anemia. It should always be considered as a possible explanation of an anemia of this type in a female, despite the statement that her periods are "normal".

Only one other example, of how an iron deficiency with a resultant anemia may occur, will be given. In a growing girl between the ages of 13 and 14 years, it is estimated that the requirements of growth, including the increase in the blood volume, plus the quantity of blood lost in 12 menstrual periods, will amount, on the average, to approximately the need for regenerating 1000 c.c. of blood. From this it is apparent why iron deficiency anemias in the female should be so common at that age. That the loss of blood at the time of the menstrual periods is important in females, is evidenced by the fact that such anemias in boys of this age are rare.

The Iron Deficiency Anemias in Wartime. Ordinarily it is thought that the frequency of iron deficiency anemia in women and children is directly proportional to the financial ability of various groups of persons to obtain a satisfactory diet. In 1935 Davidson et al. (8) made a study of the incidence of these anemias among the poor of Aberdeen, Scotland. The results were rather

startling, as the number of persons with this type of anemia was found to be greater than had been anticipated by many. It showed that an iron deficiency anemia was present in 87 per cent of the infants from 9 to 23 months of age; in 18 per cent of adolescent females; in 25 per cent of adult multiparae; and 49.5 per cent of pregnant women. In adolescent and adult males, the incidence of anemia was insignificant, being less than 1 per cent, and when present it could almost always be attributed to some organic disease, such as bleeding peptic ulcer, cancer, etc., etc. As was to be expected, it was found that such anemias are more prevalent among growing children and in women. It was concluded, therefore, that such anemias arise as a result of a diet poor in iron and of increased demands associated with growth, pregnancy, lactation, and excessive menstrual blood loss.

A similar survey was made by Davidson and his associates (9) in Edinburgh in 1942 for the purpose of determining the effect of wartime limitation of various articles of diet on the prevalence of anemia. In general, it can be said that there was one striking difference noted between the two studies. In 1942 it was found that 53 per cent of all school children between the ages of 5 and 12 years had an anemia of clinical significance. This was in striking contrast to the complete absence of anemia in this age group studied in Aberdeen in 1935. A further analysis of this group indicated that anemia was very much more prevalent (39.3 per cent) among the children of the poor who attended the municipal schools than among the children of the higher economic levels who were in attendance at private schools, as anemia was present in only 4.7 per cent of the latter students. It has been thought (9) that in peace time the economic status was the chief factor in influencing the diet of many individuals and that in wartime, on the contrary, "rationing" and the difficulty in obtaining some foods would play the most important roles. Apparently this is not true as indicated by the high incidence of anemia among the children of the poor in Edinburgh as contrasted with the relatively low incidence among the children of parents with greater means who can afford to send their children to private schools.

The study by Davidson (9) and other investigations, have not proven that there has been a general lowering of hemoglobin standards in England during the war years, but what information is available, suggests that rationing of food must be done with considerable attention to the avoidance of anemia if the war continues for a much longer period. The data from a few sample groups has been such as to stimulate a further study of the prevalence of anemia among the population in England by the Ministry of Health and The National Research Council.

Treatment of the Iron Deficiency Anemia. The treatment of iron deficiency anemia is relatively simple, and almost uniformly is productive of gratifying results. The practical therapeutic suggestions may be summarized as follows:

1. Elimination of the cause. In most instances this means the treatment of some gastro-intestinal disorder such as peptic ulcer, or cancer, or an effort to control excessive uterine bleeding. No attempt will be made to discuss the treatment of lesions of the gastro-intestinal tract which result in the chronic loss of blood, and only a few words will be devoted to a discussion of the management of uterine bleeding. Of course it is of greatest importance to determine by means of a curettage if this is due to cancer or to a fibroma. If these, and other organic conditions, are eliminated as a cause for the abnormal bleeding, then in my experience, other forms of therapy are not very satisfactory. In many instances, the administration of iron is sufficient to compensate for the extra loss of blood and despite the menorrhagia or metorrhagia, the hemoglobin and red blood cell count can be kept at normal levels. Rarely, when it is determined that this is not possible after a long trial, more radical treatment must be considered. If the patient is young, I prefer to employ hysterectomy rather than produce an artificial menopause by means of the roentgen ray, and thereby avoid the associated psychic changes which so commonly accompany the latter therapeutic measure in young persons. In my experience, however, I have found it necessary to resort to such a radical measure only in a few instances. In each case, however, in which this was done, excellent results were attained.

2. Usually satisfactory results follow the administration of iron in the form of ferrous sulphate, 0.3 grams (5 grains) to 0.6 grams (10 grains), three times daily. Although rarely do untoward symptoms follow iron therapy, it is recommended that the medication be given following meals, and in enteric coated tablets. In almost all patients, the smaller dosage will produce satisfactory results, but it should be doubled before iron

therapy is discarded as ineffective. The ferrous preparation is preferred because it is thought that all iron is absorbed in this form, and hence, it is possibly more effective in smaller doses. Reduced iron, in a dosage of 0.5 grams (7½ grains), three times daily, is also a satisfactory therapeutic agent, but my impression has been that gastrointestinal symptoms, although rare, are more likely to follow its use. The earliest increase in the hemoglobin, following iron therapy, is usually observed at the beginning of the first week, and continues, at the rate of about 1 per cent per day, until it reaches a normal level. In patients in whom the initial hemoglobin is higher, the daily increase is somewhat less.

3. The question is often raised concerning the advisability or necessity of adding copper, various vitamins, stomach preparations or liver, to iron, in order to enhance its effect. From my own experience, and that of most observers who have made a careful study of this question, I can say definitely that I do not know of anything to add to iron medication which will produce a more satisfactory result than the proper dose of iron alone in the treatment of iron deficiency anemia. Furthermore, although many of these patients have a hypochlorhydria or achlorhydria, I have not observed any benefit to follow the administration of dilute hydrochloric acid in the largest doses which the patient could tolerate.

The addition of vitamins, liver and other materials to iron for use in the treatment of anemia is important mainly from the standpoint of expense to the patient, and because some such preparations do not contain the necessary amount of iron to secure the optimum effect. My advice, therefore, in the treatment of iron deficient anemia, is to administer iron, and iron alone, in the dosage recommended, as there is no proof that the substances which have been added, increase its efficacy.

THE ANEMIAS OF PREGNANCY

The Incidence of Anemia of Pregnancy. The frequency of the anemias of pregnancy is not accurately shown in the blood survey for the following reasons. In the first place, as our obstetrical department is small, there were only 194 cases registered in it during the first 6 months of the blood survey. Of this number, only 1 per cent had a hemoglobin which was below 65 per cent and, therefore, could be regarded as a true anemia of pregnancy. Furthermore, in each case there was only one blood examination done, and that was usually early in pregnancy.

Some years ago at the University Hospital, Bethell (10) studied 158 supposedly healthy pregnant women at intervals during their pregnancy, and found that 54 per cent of them had an anemia which was greater than the physiological anemia of pregnancy. Of these, 27 per cent were of the hypochromic, microcytic type which was regarded as due to an iron deficiency; 15 per cent were of the macrocytic variety with a red blood cell count below 3.5 millions per cubic millimeter; and 12 per cent were of the combined type in which the cells were large but hypochromic. Whereas the first group were considered to have an anemia due to an iron deficiency, those of the second group with a macrocytic anemia were regarded as having a protein deficiency as a basis for the condition. The third group were considered to have a mixed anemia due to a deficiency both of iron and protein.

The incidence of 54 per cent of anemias in these patients was unexpectedly large, but it was thought to be due to the fact that many of the patients were of the low income groups. A further study of pregnant women in Hillsdale and Allegan counties in Michigan, which are essentially rural in character and the patients of a higher economic status, showed a lower incidence but one also which was somewhat larger than had been anticipated. In this group of 210 women, 14.3 per cent had an iron deficiency anemia, 4.8 per cent a dietary deficiency anemia, and in 7.6 per cent a combined type of anemia. The total number in these counties having a pathological anemia of pregnancy was 26.7 per cent.

Classification. The anemias of pregnancy may be divided into four different types as follows: (1) The physiological anemia of pregnancy; (2) The microcytic hypochromic anemia of pregnancy; (3) The macrocytic anemia of pregnancy; and, (4) Anemias which have only a coincidental association with pregnancy.

The physiological anemia of pregnancy is a normal condition which occurs in all pregnant women and is due to the dilution of the red blood cells and hemoglobin as a result of a constantly occurring increase in the blood volume. This change in the volume begins during the second or third months of pregnancy, and the maximum dilution of about 26 per cent occurs at about the sixth month. It continues at this level for the remainder of pregnancy and returns to normal

within about 2 weeks after delivery. Studies at the Simpson Memorial Institute by Bethell and his associates (11) have shown that as a result of this dilution alone, the red blood cell count may be reduced to 3.5 millions per cubic millimeter, and the hemoglobin to 10 grams per 100 c.c. of blood (64 per cent). Hence levels which are no lower than these figures just cited are not regarded as abnormal. Furthermore, unless the anemia is greater than indicated by these levels, there is usually no change in the size of the erythrocytes.

The Iron Deficiency Anemia of Pregnancy. This is the most common type of anemia of pregnancy and one of great importance, not only on account of its frequency but also because it responds promptly to iron medication. Furthermore, if this condition is not treated in the mother during pregnancy, the infant is likely to be born without adequate iron reserves and consequently will develop a deficiency of this metal, unless the proper iron therapy is provided. During pregnancy such an anemia may occur for the following reasons: (1) an increase in the iron requirement; (2) the intensification of a slight iron deficiency which exists in the mother prior to pregnancy; (3) the accentuation of the pre-existing anemia as a result of the increased blood volume.

It is apparent that there must be an increase in the iron requirement during pregnancy in order to provide the 350 to 400 milligrams of iron necessary for the formation of the fetal tissues, the placenta, and to provide for the loss of blood at the time of delivery. This is compensated for in part by the absence of 10 menstrual periods during the period of pregnancy. If it is accepted that at the average menstrual period there is a loss of approximately 50 c.c. of blood which contains 9.5 milligrams of iron, then only 95 milligrams of iron would be conserved. It seems fair to state, therefore, that the iron requirements of pregnancy are probably 2 to 4 times greater than the loss of iron by normal menstruation over a corresponding interval.

Undoubtedly the existence of a mild iron deficiency anemia prior to pregnancy is an important contributing factor to the development of a more severe type of anemia during the gravid state. This variety of anemia in the mother is usually due to a habitually low intake of iron, gastro-intestinal disorders, hypermenorrhea, and frequently repeated pregnancies. Consequently when the mother becomes pregnant, her iron reserves are depleted, and the amount of the metal which is present in the diet is inadequate to provide for the extra demands of the formation of the fetal tissues.

A third factor which is important in the causation of an iron deficiency anemia, as well as other types of anemia in pregnancy, is the blood dilution as a result of the increased blood volume. For example, it is estimated that as a result of the maximum dilution (26 per cent), a hemoglobin level of 70 per cent would be reduced to 58 per cent by this mechanism alone.

The Macrocytic Anemia of Pregnancy. The fact that a macrocytic anemia occurs in pregnancy has been known for many years, but its cause has been obscure. It is undoubtedly true that in some instances a woman with true Addisonian pernicious anemia may become pregnant and the situation be explained on a purely fortuitous basis. On the other hand, there are macrocytic anemias, often mild, which commonly occur in pregnancy and appear to be associated definitely with the gravid state. It has been clearly established by Bethell and his associates (11) that this type of anemia is related to a decreased intake of animal protein. His studies have shown that it does not exist if the intake of animal protein is 50 grams or more. On the other hand, it was present in 10 per cent of the patients in whom the intake was between 30 to 49 grams, and in 14 per cent of those with an intake of 30 grams or less. Further proof of the relationship of protein to this variety of anemia is shown by the definitely established observation that the addition of protein to the diet will result in a return of the blood to normal.

The exact mechanism whereby the deficiency of protein causes such an anemia is not entirely clear. Bethell (12) regards it as possibly due to a resultant fatty change in the liver. He considers that this may cause faulty storage of the erythrocyte maturing factor which controls the maturation of the red blood cells in the bone marrow. On the other hand, it is possible that a high protein diet may act by furnishing an excess of the extrinsic factor or by some other wholly unknown mechanism.

The blood picture in this condition is one of a macrocytic anemia which may closely simulate pernicious anemia when the reduction in the red blood cell count is pronounced. Usually, however, the red blood cell count is in the vicinity of 3.0 millions per cubic millimeter, and the hemoglobin about 60 per cent. The mean corpuscular volume

is commonly 105 to 110 cubic microns, and the mean corpuscular hemoglobin concentration 30 to 35 per cent, with a saturation index of 90 to 1.05.

Coexistence of Various Types of Anemias with Pregnancy. In some instances, a woman with an anemia of a definitely recognized type may become pregnant and the association of the pregnancy with the anemia be merely one of chance without any etiologic relationship. In several instances, we have observed pregnancy in women with pernicious anemia. Each one has been carried through to term with the proper antipernicious anemia treatment and delivered of a healthy child. Pernicious anemia in a pregnant woman, therefore, cannot be regarded as an indication for the interruption of pregnancy on the grounds that it endangers the life of the mother, or that it will in any way affect the child.

We have also observed the association of pregnancy with leukemia and the delivery of a healthy child at term. In this instance, reliance for treatment was placed entirely on repeated blood transfusions. Roentgen ray therapy was withheld because of the possible harm which might result to the fetus in utero.

Treatment of the Anemias of Pregnancy. As the anemias of pregnancy are so common, and it is not always possible for practitioners to distinguish between the physiological anemia of pregnancy and those which are of the pathological variety, it appears wise to institute certain measures to prevent the development of anemia in all women at the earliest possible moment after the state of pregnancy is determined. It is recommended that iron be given routinely during pregnancy, in the form of enteric coated tablets of ferrous sulphate, 0.3 gram (5 grains), three times daily, after meals. This should be begun as early in pregnancy as possible and continued throughout pregnancy and lactation. Rarely, if ever, does such medication result in gastrointestinal symptoms, but in order to avert the possibility of such a complication, the iron should be given in enteric coated tablets, and following meals. If an iron deficiency anemia should develop while the patient is taking this form of therapy, which would be an exceedingly rare event, then the dosage should be doubled.

Also, the patient early in pregnancy should be placed on a diet which contains an adequate amount of protein. It is recommended by Bethell and Blecha (13) that there be included in the regular diet of each pregnant woman, *at least* ¼ pound of lean meat, 1 egg, and 1 quart of milk daily. This will provide a diet containing a minimum of 50 grams of animal protein which should insure against the appearance of a macrocytic anemia in most instances.

If a macrocytic anemia of considerable severity is detected during pregnancy, then intramuscular liver extract should be given in doses of 1 c.c. (15 units) three times weekly, until the blood returns to normal.

PERNICIOUS ANEMIA

Pernicious anemia may be defined as a macrocytic anemia attributable to a failure of the glands of the fundus of the stomach to secrete a sufficient quantity of a thermolabile enzyme-like substance which is essential to the normal maturation of the red blood cells. The condition most commonly occurs in adult life, and, when fully developed, is characterized by the symptoms of anemia, a constantly occurring achlorhydria, a frequently associated parathesia of the hands and feet, recurrent glossitis, and degenerative changes in the posterior and lateral columns of the spinal cord. It always progresses to a fatal termination, usually with remissions, unless specific therapeutic measures are instituted.

The Incidence of Pernicious Anemia. This disease is not important because it is one of common occurrence, but because of the highly effective specific form of therapy which in recent years has been made available for its therapeutic management. As a consequence, it is now possible for such patients to survive for a long period of years, provided adequate treatment is given.

The condition occurs most frequently between the ages of 45 and 55 years which is the same age distribution as cancer. If the number of persons who are living in the various decades are taken into account, however, it would be considered to be a disease of old age. With the present increase in longevity, there doubtless will be a greater incidence of the disorder. Some idea as to how common this condition is, may be gained from the statement that at the Henry Ford Hospital in Detroit (14), it is reported that 2.2 cases occur per 1000 admissions. In the Peter Bent Brigham Hospital of Boston (15), there was a ratio of 1 patient with the disease to each 161 admissions, or 6 per 1000. Askanazy (16) in 1937 gave an inci-

dence of 6.9 per 100,000 of the population in the United States, 9.1 in Canada, and 9.18 in Sweden.

Treatment of Pernicious Anemia. The treatment of pernicious anemia is a relatively simple matter as the guiding principle is to administer an amount of potent antipernicious anemia medication which will cause the blood to increase from the anemia level to normal limits in the shortest possible time. This having been accomplished, a sufficient quantity should then be given to maintain the red blood cell count and hemoglobin level within normal limits.

Only U.S.P. preparations should be employed, as they have the advantage of being certified for potency in terms of arbitrarily designated units. Officially, a unit is defined as the amount of material, when given daily, which will produce a maximal reticulocyte response and a satisfactory increase in red blood cells. There is general agreement that the intramuscular injection of liver extract is the most satisfactory form of therapy at present, as it insures complete absorption of a highly concentrated and effective agent. This is either utilized by the body at once, if it is required, or is stored and ultimately used as the need occurs. Hence, if the patient is given an overdosage, this is not wasted as it will eventually be utilized. Liver extract for intramuscular use is avilable in strengths of 1, 2, 2.5, 3.3, 4.5, 10, and 15 units per cubic centimeter. The more concentrated preparations have a small bulk, and hence are more convenient to use. In my opinion, there is no advantage in employing the dilute extracts. Some state that the crude extracts, which are low in potency, are more effective in treating the neurological manifestations, but there is no conclusive proof in support of this claim.

When administering liver extract, or any other form of antipernicious enemia therapy, the best advice to follow is to err on the side of giving too much, rather than too little. This is because an excess can do no harm, and it should be strongly emphasized that the most common cause for poor results in the treatment of this disease is an inadequate dosage. When a patient with pernicious anemia is first seen in relapse, 1 c.c. containing 15 units, should be given daily for one week. Subsequent therapy should consist of 1 c.c. three times weekly until the blood has reached normal. This means that the red blood cell count in females should be 4.5 and in males 5.0 millions per cubic millimeter or greater. Furthermore, the red blood cells should be normal in size and the mean corpuscular hemoglobin concentration should be within normal limits. There is no evidence to indicate that an excess dosage will result in an increase of the red blood cell count to the polycythemic level, or otherwise do harm.

The Massive Dose Technic. This method has been employed more in Germany than in this country where it is called the "depot method" of treatment. It has one advantage, namely, that the patient is insured of having an adequate amount of antipernicious anemia material available for at least 3 to 4 months. In some patients who are negligent and fail to return for weekly injections, this may be a more efficient form of treatment. The method used by Askey (17) is as follows: on the first day, 1 c.c. containing 15 units is injected. If there is no reaction, on the following day 9 c.c. containing 135 units is given intramuscularly. Theoretically, this should be adequate to provide medication for a period of 150 days, but it is advisable to continue therapy by giving 2 c.c. once monthly thereafter.

Maintenance Dosage. The amount of liver extract required to maintain the blood in a normal condition depends on an individual variation, the age of the patient, and the presence or absence of infection. It is known that older persons require a greater dosage, and that when an infection of any type is present, the dosage should be doubled. At no time should one run the risk of giving a suboptimal maintenance dosage. I prefer to give the average patient 1 c.c. (15 units) every one to two weeks, although others will give the same amount every month. The latter dosage is inadvisable although some patients may do fairly well on it for a considerable period of time. In general, however, the following plan of dosage should be followed.

1. Sufficient intramuscular liver extract should be given to maintain

   (a) the red blood cell count at 4.5 millions per cubic millimeter or higher.

   (b) the mean corpuscular volume within normal limits (86 to 96 cubic microns).

   (c) the color index at 1.0 or less.

2. There should be no symptoms such as parathesia or glossitis.

3. The dosage should be doubled if

   (a) there is a recurrence of parathesia.

(b) any other symptoms attributable to the spinal cord lesions appear.

(c) if any infection occurs.

Allergy and Liver Extract. Ordinarily a great majority of patients can take liver extract intramuscularly for years without developing untoward symptoms. In a few, however, allergic manifestations will appear either when the medication has been given for a long period of time, or when it has been resumed after an interval during which all liver medication has been discontinued. The symptoms, which usually develop promptly after the injection, are flushing of the face, palpitation, tachycardia, urticaria, stuffiness of the nose, occasionally an outspoken asthmatic attack, and in rare instances, loss of consciousness with incontinence of urine. They are usually controlled within a few minutes by the injection of adrenalin subcutaneously.

It has been determined that these allergic manifestations are due to an organ, rather than a species sensitivity, and hence a person may be sensitive to beef, mutton, and pork liver, but not necessarily to other tissues from these animals. Positive skin tests develop when there is clinical evidence of sensitivity, and when they disappear, which is usually within about 4 months after the medication is discontinued, the general allergic symptoms likewise are no longer present.

When a patient develops evidence of allergy to the intramuscular injections of liver extract, there are several courses to pursue, as follows: (1) Discontinue the intramuscular injections of liver extract and give desiccated, defatted hog stomach (ventriculin) in doses of 20 to 40 grams daily. (2) Extralin, a stomach-liver combination may be given in doses of 2 grams (4 pulvules) three times a day. (3) Liver extract may be tolerated orally in adequate maintenance doses of 12.75 grams, or 3 level teaspoonsful daily which represents one U.S.P. unit. (4) The patient may be desensitized, but opinions vary concerning the advisability of this. The desensitization may be accomplished by the following plan: an initial dose of 0.1 c.c. of a 1–10 dilution of liver extract is given subcutaneously. This dose is increased 0.2 c.c. every second or third day for about three weeks, at the end of which time the patient is receiving a full dose of the preparation.

Iron and Dilute Hydrochloric Acid Medication. Rarely is it necessary to give iron to patients with pernicious anemia, but occasionally if the hemoglobin lags too far behind the red blood cell increase, it is advisable to administer iron which is best given in the form of ferrous sulphate, 0.3 grams (5 grains), three times daily. The associated iron deficiency may be due to chronic bleeding, such as occurs from hemorrhoids, or possibly from a low iron intake. It is of interest that in recent years the Germans have found it advisable to give iron to practically all patients with the disease, which would suggest that the iron content of the diet in Germany at present is below the optimum level.

It is not my custom to give dilute hydrochloric acid to patients with pernicious anemia for several reasons. First, because all of the gastric complaints usually disappear as the result of adequate antipernicious anemia medication, second, because one cannot hope to give a sufficient amount of hydrochloric acid therapeutically to replace that which is normally present in the stomach. Finally, I have not been able to demonstrate, in a controlled group of cases, that the administration of large doses of this medicament had been of benefit.

Other macrocytic anemias may simulate the blood picture of pernicious anemia closely in some instances, and in some, the response to antipernicious anemia therapy is satisfactory. The following conditions are characterized by the blood picture of a macrocytic anemia: (1) The anemia associated with a deficiency of some component of the diet, the extrinsic factor; (2) Widespread liver disease, as cirrhosis; (3) Intestinal strictures or anastomoses; (4) Total gastrectomy; (5) Achrestic anemia; (6) Tropical anemia, possibly due to a diminished intake of the extrinsic factor; (7) Hypothyroidism; (8) Idiopathic steatorrhea and celiac disease; (9) Some cases of sprue and pellagra, also possibly due to a diminished intake of the extrinsic factor; (10) Space consuming lesions of the bone marrow such as multiple myeloma, leukemia, myelosclerosis, and carcinomatosis may be associated with a macrocytic anemia, although commonly it is of the normocytic, normochromic variety.

Of the conditions mentioned above, a more or less satisfactory response to antipernicious anemia therapy is observed in all except in the case of achrestic anemia, the anemia of hypothyroidism, unless there is an associated pernicious anemia which sometimes occurs, and in space consuming lesions of the bone marrow.

The Prognosis in Pernicious Anemia. There are three important aspects of the patient to consider when formulating the prognosis in any given case. They are (1) the condition of the nervous system, (2) the ability of the patient to cooperate, (3) the status of the patient's general physical condition with reference to the presence or absence of complicating conditions, such as cardiac disorders, hypertension, nephritis, and other diseases which are commonly the cause of death at middle age or older.

Before the modern treatment of pernicious anemia was introduced in 1926, it was recognized that the average life of a patient with the disease was between 2 and 3 years after the onset of the initial symptoms. It is now known that the duration of life is greatly prolonged by treatment, but the average patient with the disease does not at present live out his entire anticipated life expectancy. The cause of death in about one-half of the patients with pernicious anemia is referable to the changes in the nervous system, and in the other half to coincidentally associated diseases such as apoplexy, heart disease, pneumonia or nephritis.

REFERENCES

1. Robscheit-Robbins, F. S., and Whipple, G. H.: Infection and Intoxication; their Influence upon Hemoglobin Production in Experimental Anemia. J. Exper., Med., **63:** 767, May, 1936.
2. Vaughan, J. M., and Saifi, M. F.: Haemoglobin Metabolism in Chronic Infections. J. Path. & Bact., **49:** 69, July, 1939.
3. Willison, G. W.: Effects of Bacterial Toxins on Erythrogenesis; Study of Peripheral Blood Picture in Rabbits made Anemic by Chronic Hemorrhage. J. Lab. & Clin. Med. **24:** 383, Jan. 1939.
4. Moore, C. V., Arrowsmith, W. R., Welch, J., and Minnich, V.: Studies in Iron Transportation and Metabolism; Observations on Absorption of Iron from Gastro-intestinal Tract. J. Clin. Investigation, **18:** 553, Sept. 1939.
5. Hahn, P. F., Bale, W. F., Lawrence, E. O., and Whipple, G. H.: Radioactive Iron and its Metabolism in Anemia. J.A.M.A., **111:** 2285, Dec. 17, 1938.
6. McCance, R. A. and Widdowson, E. M.: Iron Excretion and Metabolism in Man. Nature, **152:** 326, Sept. 18, 1943.
7. Barer, A. P., and Fowler, W. M.: Blood Loss During Normal Menstruation. Am. J. Obst. & Gynec., **31:** 979, June, 1936.
8. Davidson, L. S. P., Fullerton, H. W., and Campbell, R. M.: Nutritional Iron-deficiency Anaemia, with Special Reference to Prevalence and Age and Sex Incidence. Brit. M. J., **2:** 195, Aug. 3, 1935.
9. Davidson, L. S. P., and others: Nutritional Iron Deficiency Anaemia in Wartime; Haemoglobin Levels of 831 Infants and Children. Brit. M. J., **2:** 505, Oct. 31, 1942.
10. Bethell, F. H.: Blood Changes in Normal Pregnancy and their Relation to Iron and Protein Supplied by Diet. J.A.M.A., **107:** 564, Aug. 22, 1936.
11. Bethell, F. H., Gardiner, S. H., and MacKinnon, F.: Influence of Iron and Diet on Blood in Pregnancy. Ann. Int. Med., **13:** 91, July, 1939.
12. Kyer, J., and Bethell, F. H.: Production of Macrocytic Anemia in the Pregnant Rat by Diets Low in Protein. Arch. Path., 1938, xxv, 761.
13. Bethell, F. H., and Blecha, E.: Diet in Pregnancy. Clinics, **1:** 346, Aug. 1942.
14. Jahsman, W. E.: Pernicious Anemia; its Prevalence and Adequate Treatment; Review of 223 cases. J. Michigan M. Soc., **38:** 405, May 1939.
15. Friedlander, R. D.: Racial Factor in Pernicious Anemia: Study of 500 Cases, Am. J. M. Sc., **187:** 634, May 1934.
16. Askanazy, M.: Die pathologische Anatomie der Anämien, in Comptes rendus de la troisieme Conference internationale de pathologie geographique. Helsingfors, Mercators Tryckeri, 1937, p. 32.
17. Askey, J. M.: Quantitative Treatment of Pernicious Anemia: Response to Initial Massive Dose of Liver Extract in Relapse. J.A.M.A., **117:** 907, Sept. 13, 1941.

Observations on the Treatment of Infantile Paralysis in the Acute Stage*

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MANY people who never have had poliomyelitis have protective antibodies against the virus of this disease in their blood streams. The virus in the gastrointestinal tract may approximate grey-fibered axis-cylinders, for which it has an almost obligate affinity but the disease might not be produced were the virus rapidly absorbed and destroyed, quickly excreted and lost, or neutralized by natural means before it reached the central nervous system. The virus itself may be found in the gastrointestinal tract of at least 10 normal persons to each one who has the infection, a ratio that may be higher in large epidemics. Thus, during an epidemic many harbor the virus in the gastrointestinal tract, but only a scant few develop objective symptoms of the disease. *Poliomyelitis, therefore, could be considered an accident which occurs during the process of mass exposure.*

Within 24 hours after the subserosal injection of virus in the experimental animal, lesions can be found in the cells of the autonomic and spinal ganglions. Within 36 hours they can be seen in the cord, with involvement of the motor and tissue cells in the anterior, lateral and posterior areas. The central nervous, sensory and motor as well as the autonomic systems are involved and the meninges irritated. The motor cells are those regarding which there is most concern. In the cord is karyolysis, neuronophagia, cellular infiltration with lymphocytes or leucocytes, crowding of Virchow's space and perivascular cuffing with lymphocytes, the so-called classic picture of cord poliomyelitis.

If we could follow reactions as they occur it would be found that first motor cells are destroyed and Nissl's substance lost; next fading, shrinking and karyolysis of the cellular structures follow, with perhaps oedema and congestion. Neuronophagia occurs simultaneously or soon after cellular destruction. At the same time, there may be an increase of polymorphonuclears. These are primary phenomena.

Subsequent reactions, increased vascularity, perivascular cuffing, lymphocytic infiltration and localized collections of red cells are secondary phenomena. They need not be present to make a definite diagnosis.

Single small, extensive or multiple, hemorrhages may be found in grey-fibered areas of the spinal cord, particularly in the area of the anterior horn cells and in the pars intermedia. In view of the pathology, it does not seem wise to inject fluids, nor use atropine in the acute stage of the disease. Those of us who treat patients with bulbar paralysis know that atropine is contraindicated at this time though it may have possible uses later. Sympathetic and parasympathetic drugs are also of little value at this time.

Motor cells may be destroyed without gross evidence of the disease in the peripheral muscles. A number of uninvolved cells remaining in the cord may have sufficient axis-cylinder connections to allow impulses to be sent directly to most of the muscle fibers, making synchronous movement possible. Weakness, however, can be demonstrated by proper methods. Sometimes, many motor neurons may be destroyed and yet the peripheral muscles may show only a minimal amount of paresis or paralysis.

Muscle fibers connected with destroyed motor cells die unless they have some overlapping of supply from viable cells of other segments. Although dead muscle tissue atrophies, remaining muscle fibers still innervated can hypertrophy. With exercise, such a muscle may become as bulky as that of comparably uninvolved muscles, and movement may again become synchronous and objectively normal. Weakness at this time would only be appreciated by testing muscles with force against gravity.

In some patients a few neurons with their axis-cylinders may still remain connected with muscles

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but despite this fact they seem completely paralyzed—they cannot be moved voluntarily. They are completely flaccid. The impulse traveling from the cord to the muscle along the few surviving fibers is insufficient to move any of them. The remaining innervated muscle fibers cannot react to their best capacity because they are braked by some condition, probably in the muscle. Patients with this type of an involvement are the ones who show improvement with muscle training and physiotherapy. They are the ones on whom a new therapy should be tried.

If all the motor cells are destroyed, there can be no muscle regeneration and voluntary movement will never again be possible.

The functions of weak or paralyzed muscles do not return at once. The inability to move muscles does not arise because of mental alienation. It is the result of physical phenomena that follow pathologic reactions. The patient cannot move the muscle because too many motor cells have been destroyed and the peripheral muscle is in no condition to respond to a weakened stimulus. A patient with paresed or paralyzed muscles may substitute others for those involved. The substituted muscles hypertrophy. The patient continues using them to the exclusion of the opposing paresed or paralyzed ones. He develops a conditioned reflex response or actually a new pattern of walking. Retrograde Wallerian degeneration has been demonstrated by Ranson as far back as 1907. In our instance, and in due time unused paresed or paralyzed muscles atrophy and fixation develops. Should the condition exist too long, there is no recovery and the ultimate result is that nerve connections are lost, imbalance and substitution become permanent and deformities result. Although the patient in the acute and subacute stages is unable to project motion over the few normal fibers left, with physical therapy and strengthening of the weakened muscles, he may become able to do so.

A secondary condition is caused in the muscles by the paralysis. There is a disturbance in vascular supply as a result of which muscle fibers lose some of their irritability and need more stimulus to contract. This muscle condition tends to brake the response to normal stimuli. The same condition is present in other neurologic conditions.

The phenomena of braking is easily demonstrated. In poliomyelitis when the seventh nerve is paralyzed, it is unusual not to find some remaining connecting fibers from the central nervous system to the facial muscles despite the fact that the muscle is completely flaccid. If the brake is removed by massage of the muscle and the application of infrared heat for 30 minutes, the muscle, if there are still some connections, may then be moved voluntarily until such time as it again cools. This in itself constitutes good evidence first that the muscle should be kept in good condition and second that there usually is still some nerve connection left. On the other hand, when the seventh nerve is affected in Bell's palsy, a condition in which all the branches of the peripheral nerve are involved, there is no such transmission of voluntary impulses and the experiment is negative (1).

A few actually connected neurons with their axis-cylinders may take over the function of the entire nerve. *However, as demonstrated in clinical experience, these few fibers in an apparently completely paralyzed muscle can move the muscle only if it is kept in good condition. This can be done by maintaining the blood vascular supply and by passively activating it so that it does not offer any resistance to projection of impulses.*

From postmortem examinations of monkeys who have had poliomyelitis we have seen that even with no nor slight clinical symptoms, there will be some pathologic reactions in the cord. We have also found that this reaction will usually be more severe than signs in the peripheral muscles seem to indicate. The autopsy examination of a human that recovered from poliomyelitis and died shortly after with another disease—had a similar *disproportion* (2). Thus, there is no strict parallel between pathology and objective signs of disease. It becomes equally obvious that outside of the imagination there can be no such simple classification as only paralytic and non-paralytic types.

In infantile paralysis some muscles may be strong; others weak. There is imbalance—not incoordination. Incoordination has been recently defined as "inability to perform a given motion through smooth and sustained contraction and relaxation of mechanically correct muscle groups." If this is a correct definition, then under its terms one must include spastic conditions, the peripheral neuropathies, the dystrophies, myotonias, etc.

In the past, the term incoordination was reserved for muscles that had normal lower but involved upper motor neuron supply. Weakness does not characterize this condition. The trouble

is that the muscles supplied to agonist and antagonist contract simultaneously. There is no reciprocal inhibition, and a spastic condition develops with incoordination. There is no such incoordination in infantile paralysis.

In poliomyelitis, a weak or no impulse reaches the muscles. The patients in whom this occurs have paresis or paralysis of muscles which cannot be moved while other muscles may. This inability to provide smooth function through arcs of movement is due to imbalance.

The pathogenesis of the disease can best be appreciated from clinical evidence (3, 4). It was first shown by us that when M. mulatta monkeys were given the virus of poliomyelitis subserosally or between intestinal clamps the disease could be produced (5). This was called too drastic an experimental procedure, a strange objection when one remembers the other artificial routes used to produce the disease and from which conclusions were drawn. The point glossed over by critics was the fact that the disease produced was not like the fulminating paralysis that follows injections via the intranasal, intracerebral, intrasciatic and other routes but the typical paresis of muscle groups, monoplegia, etc. seen in human poliomyelitis. Also important was the fact that when we used this method we avoided contaminating the olfactory area. Several years later Howe and Bodian produced the disease in chimpanzees by having them merely swallow the virus. The bulbar and 7th nerve involvements were easily reproduced (6, 7, 8).

In 1928, I outlined the way virus probably spread to the cord. It was not until 1935 that the figure was finally published (9). A comparison between the figures I used to illustrate this spread in 1935 and one shown seven years later by another author in 1942 (10; Fig. 13) are similar.

The virus probably is picked up by both efferent and afferent fibers, but since the afferent fibers run directly to the cord and end in the intermediolateral cell column area, these are probably of most importance. An irritative poison following this pathway would first irritate the somatic nerve, cause hyperactivity of the reflexes and possibly clonus and as it reaches the intermediolateral cell column area, it might irritate the adjacent cells and fiber tracts causing a Babinski reflex response. This is exactly what happens in the patient with a severe typhoid fever. In this you have an irritative poison, in poliomyelitis a cellular poison with toxic destruction of cord cells leaving no medium to transmit response when stimulated.

The intermediolateral cells column area is commonly found to be the seat of dilated and ruptured vessels and small hemorrhages. As the products of inflammatory response are absorbed the threshold of response to stimuli may be lowered and a reflex contraction might follow stimulation of the stretch reflex, possibly—even in some instances aberrant mediations may arise de novo in the cord. These aberrant reflex responses might practically fix muscles so that the individual becomes a permanent invalid. That there are cross reflex responses in normal individuals is clear from a study of Hoover's contralateral opposition sign. In this connection, it should be noted that the internuncial neuron has recently been given attention.

Persons with muscles disconnected from nerves may have reflex reactions in the opposing muscle, reflexes mediated through the cord. It is not surprising, therefore, that in this disease the opposing muscles of those that are paresed may have reflex contractions also.

The initial disease is not in the muscle, but in the cord and the reactions to the opposing muscle are mediated through the cord. Spasm is a new term for an old, well-recognized neurologic response, a conception that had its roots in Sherrington's experiments of 75 years ago.

This reflex contraction or spasm is not present from the beginning. The time interval between onset of paralysis and the beginning of reflex contraction is variable. The reason why this condition has become so distinctive to those who have never previously studied infantile paralysis in its early stages is because the patient usually was not seen in the hospital until the reflex contraction had developed. If one sees the patients early enough and reflex contraction is present it is found that pareses or paralysis always precedes the reflex contraction. One must keep meningeal irritations separate from reflex contractions.

The corner stone for belief in spasm has been the cathode ray oscillograph studies of Schwartz and Bouman on muscle potentials (11). Their results have been refuted in two laboratories (12, 13) and by a study in our own department only this last year (14). There is no true spasm. In fact, neutral points may be easily demonstrated where there are no demonstrable potentials.

Some believe that reflex contraction (spasm) is

primary and that the weakness called paresis or paralysis is secondary. Such a position is incongruous in the light of pathologic and experimental evidence. How is it that one finds patients with early morning paralysis, patients who had no previous reflex contractions (or spasm)? How is it that sometimes muscles may become massively paralyzed at once without previous reflex contraction?

The important questions, however, are (1) "How many patients have this reflex response?" (2) "How long does it last?". The answer to the first is only those with initial paresis or paralyses have the condition and not every one of these, and the reflex contraction may be manipulated free within 2–40 days at the most in the exceptional case.

What about all this talk of pain? Reflex contraction does not trouble the patient nor does it cause pain if he is in a comfortable position, and if he does not move the muscles and irritate the stretch reflex. If the patient stays in a position of ease, he has no pain. This pain felt when the stretch reflex is irritated is not due to exteroceptive impulses because it is still present when all external influences are obliterated by painting paraffin over the area of the involved muscle. If it is admitted that reflex contraction (spasm) is the primary cause of poliomyelitis, we must infer that there are two diseases caused by the same virus, one in the cord and one in the muscle—a wholly illogical assumption.

It is felt, however, that if the reflex contraction (or spasm) continues long enough and is severe enough that previously weakened opposing muscles may be made worse. From this standpoint alone the treatment of severe reflex contraction (or spasm) is indicated.

Statements have been made that treatment may produce good effects on the urinary bladder or that the bladder condition may be the result of spasm of peripheral muscles. There is urinary bladder retention usually preceding, occurring with and only occasionally following somatic paralysis, a condition having naught to do with peripheral somatic muscles (15). There may be evidence of intestinal paresis if the bowels are constipated and the returns of enemas are clear. Intestinal gurgling may not be heard over the abdomen, especially if the gut is severely involved and peristaltic waves are not seen. These findings can be noted even before somatic paralysis occurs, and again they are centrally produced.

Autonomic function returns to the paralyzed bladder and bowel within 7 to 21 days no matter how severe the somatic paralysis. Rarely is the bladder involved longer, providing it is emptied about 3 to 4 times daily. If retention is not relieved, the disease may spread. These functions return no matter what form of therapy is employed. In rare instances only may there be paralyses of the sphincter muscles of the rectum.

There are other evidences of central autonomic involvement. Often the patient sweats more profusely over the affected area when pilocarpine is injected (16). Epinephrine, a specific thoracolumbar stimulant, does not stop this sweating over involved while it does over uninvolved areas. This indicates a specific disturbance of the thoracolumbar outflow, again demonstrating involvement of the sympathetic nervous system.

There are subjective sensations of a cold feeling present and objectively the skin over paralyzed areas may be cool. These manifestations are probably due to vasomotor phenomena secondary to involvement of the autonomic nervous system. Such sensory findings are quite different from the appreciation of external cold and heat, which all patients possess unimpaired. No trophic ulcers ever developed unless there is pressure. If they do occur, the diagnosis should be questioned.

Recently there has been much said about proprioception. Yet there does not seem to be any great disturbance of this sense, since the patient knows his position in space and is well aware of his spacial relationships. There may be, however, a lowered threshold of the stretch reflex and we have been able to show that the vibratory sense easily tires.

A diagnosis must never be considered proven in the absence of positive findings in the spinal fluid, if the clinical involvement is not segmental in character and if the lesion is not one of the lower motor neuron.

No persons with distinctive sensory findings (dissociation of temperature, pain sense, etc.) and signs of an upper motor neuron lesion can be diagnosed as having poliomyelitis, despite the presence of paralysis.

The statement may be made that patients have pain if examined, pain which might retard or impede recovery. This is nonsense. Some examiners may state that they can feel where paralysis is and this is sufficient. This implies powers of divination possessed by none. It paves the way for therapeutic credit for impossible results.

Impressions can never replace thorough examination.

The patient should be carefully examined on admission to the hospital and an estimate obtained of muscle function, and the presence or absence of reflex contractions noted. When results of therapy are to be gauged, however, the patient should be examined for his base line condition two weeks after entrance to the hospital since some patients have spontaneous recoveries within that period, recoveries which have occurred in the past despite therapy.

Patients should be examined thoroughly for unless this is done MARKED BENEFICIAL RESULTS CAN BE ASCRIBED TO SOME THERAPEUTIC PROCEDURE WHEN THE PATIENTS TREATED MIGHT NOT EVEN HAVE HAD POLIOMYELITIS, BUT WHO IN ORDER TO RECOVER NEEDED ONLY THE REST PRESCRIBED FOR THE POLIOMYELITIS PATIENT IN THE EARLY STAGE OF THE DISEASE.

If the patients are not examined carefully, how can we exclude those persons with weakness and stiffness associated with acute infections—patients with *rheumatic fever* and stiffness, with influenza and weak muscles, with *encephalitis* and paralysis, with muscular dystrophy, with *acute arthritis*, with tumors, and particularly with "*peripheral neuropathy?*" The latter, like infantile paralysis, is a lower motor neuron lesion. One cannot always utilize sensation to discriminate between the two because, in my experience at least, striking objective sensory symptoms in peripheral neuritis are not the rule. Differentiation can only be made by determining whether the involvement is segmental in character.

If a person has massive paralysis due to the virus of poliomyelitis and this paralysis persists with complete flaccidity for a month, there has been a great destruction of motor cells. In this event, recovery will not occur at all, or will be partial, or be complete. It would take a long time, however. *Therefore, when one sees patients who have had complete paralysis of all extremities for a month or so improve to the point where, at the end of a few months, they are walking about without any muscular weakness, one can be certain that they never had poliomyelitis.*

All these diseases just mentioned cannot be positively differentiated if laboratory work and a meticulous clinical examination have not been done. Is this an exaggeration? Not when it is realized that during the hysteria of an epidemic at least 15–50 per cent of those patients sent to the hospital with a diagnosis of poliomyelitis do not have the disease.

A stiff back is found in this disease, as is tightness of the hamstrings and occasionally stiffness of the posterior neck with weakened sternocleidomastoid muscles. These findings have long been recognized and described in the literature as a positive Kernig's sign, stiff back, pain along the spine, stiff neck, neck drop and opisthotonos. Such reactions are found in any form of meningeal irritation, with sprains, Pott's disease, the encephalitides, etc. They should not be confused with reflex muscle contractions. These objective signs are insignificant in the non-paralytic patient.

I have seen experts in poliomyelitis point to tight hamstrings and deduce that because of limitation of motion, the patient still has poliomyelitis or is not better. They are often blissfully unconscious of the fact that neither they, the demonstrators, nor anyone in the audience ever had any better mobility of action.

We forget sometimes that no person is symmetrically built. No one has the same amount of comparable strength on both sides of the body. There is not an individual who passes the age of three but who does not have some beginning limitations of this previous freedom of motion. Practically every adult has this limitation of motion.

Not all persons have the same fluidity of movement. Muscles may be too long or too short; skeletal growth may not have paralleled muscle growth; persons may be large and fat, short and dumpy or slim and thin; they may have a pot belly. There will be difference in the pelvic structures, depending on the sex. Thus, it would be more natural than not to find some limitations of motion in practically all patients examined.

Could slight changes in the spinal column, such as mild lordosis and scoliosis, have been due to unrecognized cases of infantile paralysis? Such a claim would reveal an abysmal ignorance of the history and the epidemiology of the disease. It amounts to a statement that crooked backs have been brought about by unrecognized subclinical attacks of infantile paralysis in areas where there have been no cases.

A perusal of the literature for the last 30 years reveals that there never has been any uniform therapy for infantile paralysis. Each center has its own particular idea as to how the disease should be treated. Feiss was the first to state that the paralyzed child is happier without splints and that

casts were aphysiological (17). In Cleveland we have not used casts and have treated our patients early and actively in the hospital on my service for the last 22 years.

Some physicians have placed patients in casts and kept them there for long periods of time. If this is what is meant by orthodox treatment and immobilization, then I agree that it is of little value and may be harmful.

There are those who temporarily immobilize the patients, place them in neutral positions, keep them in loose splints or casts for the first few weeks and then employ early physiotherapy. Others daily remove the patients from their appliances and give physiotherapy. If this is what is meant by immobilization, I ask for proof that such a technic will cause damage. No one has demonstrated that it does.

Our practice of placing the patients in neutral position propped up by sandbags, etc. is splinting in a sense just as are hot packs properly applied, amongst other things, mild splints.

The objective of our methods of treatment has been to conserve muscle function by conserving the muscles to maintain balance, to get our patients up early and to keep the muscles in good shape until a stimulus from the nerves can move them. This is best done by causing the blood vessels to be dilated, thus keeping the involved muscle areas well vascularized. This is accomplished by the use of some form of heat, in our instance infrared heat and warm water. Our results have been frequently demonstrated (18).

More important than the type of heat employed in the early stages, a point of endless controversy, is the fact that physiotherapy should be started early and persisted in for a long period of time. Patients with severe involvements may be in the hospital the better part of a year. Physiotherapy must be employed persistently and patiently during that length of time. If patients insist on ambulatory treatment too early they may expect complications, i.e., substitution, contractions and even scoliosis.

Within two to three days after the acutely ill patient has been admitted to our hospital, we start active and passive motion and apply galvanic current to the weakened muscles and start to reeducate them. If there is reflex contraction the muscle contracted is gently manipulated free and stretched. Manipulation and movement do not injure muscles nor encourage fibrous tissue deposition. Hines (19) has shown that in the experimental animal after an injury to a peripheral nerve resulting in paralysis, activity, electrical stimulation even to the point of overstretching and local fatigue do not appear to be detrimental, but act in the direction of improvement in the rate and extent of recovery from paralysis of the peripheral nerve. It is stated that this movement sets up aberrant stimuli which aggravates conditions. Some critics place patients with the feet at right angles to the bed against a board—an ancient maneuver by the way, thus setting up continuous proprioceptive stimuli. The patient is as splinted as if he had a right angle splint applied. It accomplishes the same purpose and there is no reason to expect a different physiological reaction. Most of us, however, feel better without any covering. Even our patients in the neutral position between sandbags must be considered splinted in the broadest sense and recently we have found that hot packs properly applied are most convenient splints to keep an active infant from over stretching his muscles.

Galvanic stimulation of the paresed muscle has been used by us for over 20 years. Only recently Gutmann and Guttmann (20) have remarked on the importance of inducing muscular contractions by galvanic stimulation to accelerate the return of muscles to their initial volume, to reinnervate and possibly avert atrophy.

The status of the patient is compared subsequently at frequent intervals. Such examinations do not harm the patient. The objective state of the muscle has been graded by Toomey and his staff for the past 20 years in terms of the number of volts of galvanic current it takes to cause a muscle contraction.

Our clinical conclusion has been that the reaction to galvanic current, as the physiologists report, parallels muscle efficiency. A greater number of volts are necessary to cause contraction when applied to the proper point of the muscle when it is first paralyzed than when muscle function has recovered. We should note, however, that as the patient gets better, the muscles may respond to what might be considered a normal stimulation, yet though the same as the normal the muscles may not be voluntarily movable. This is a good prognostic sign and means that the patient will soon recover voluntary motion. The patient who has been instructed to project impulses over his nerves will tell the physician that he feels that these impulses are transversing the nerve and that his muscles are moving long before they actually do

move. This too is significant of the beginning approach to voluntary movement.

We urge the patient to walk—if possible, within the week of admission—correctly, of course, and with the aid of attendants. If the muscles are too weak to bear weight, the patients are kept in bed until they gain strength and in the meantime, the weaker muscles are educated.

We encourage him to concentrate on the paresed or paralyzed muscle and to send impulses through the deadened muscles, a maneuver introduced by Feiss (17). Very often, long before the patient can move a certain muscle, he can tell us that he feels a sense of motor impulse projection in the muscle. Then, in succession, we try for a sense of movement, for movement in the position of best muscle response with the least muscular effort, for movement in an increased arc of motion by passive aid, for movement against gravity and finally for movement against increased opposing pressure.

How should findings be interpreted? Misunderstandings arise as to results of therapy, usually because individuals do not speak the same language. What is meant by cures, by paralysis, spasm, orthodox, etc.? Everybody has a different interpretation. Some therapists group all types of patients together and treat every patient, despite the fact that many patients do not require treatment. Obviously, statistics from such clinics do not reflect the actual results of therapy and their percentages of recovery may be misleading. Some just repeat claims of good results and present no evidence to substantiate their claims.

Elsewhere, the basic fundamentals in poliomyelitis were noted. These must be understood to evaluate therapy (21). A classification was attempted. Seven types of disease were given, but it was later found that these seven could be further contracted as follows.

Group 1. Patients with:
- Subdivision A. virus in the gastrointestinal tract without symptoms.
- Subdivision B. virus in the gastrointestinal tract with gastrointestinal symptoms.
- Subdivision C. virus in the gastrointestinal tract plus nausea and pain in the belly.

Group 2. Patients with:
- gastrointestinal symptoms plus spinal fluid findings and no paralyses.

Group 3. Patients with:
- symptoms, especially gastrointestinal; signs of meningeal irritation, but no stiff neck; no paralyses.

Group 4. Patients with:
- the same findings as in group 3 plus a stiff neck.

Group 5. Patients with:
- Subdivision A. any or all the above signs plus segmental paresis which is only apparent against severe force, but which causes no functional impairment.
- Subdivision B. signs as in subdivision A, plus segmental paralyses.
- Subdivision C. segmental paralyses involving the phrenic and intercostal nerves with or without involvement of other segmental peripheral nerves.
- Subdivision D. bulbar involvements
  - Alpha. of cranial nerves only
  - Beta. of cranial nerves in combination with segmental spinal involvements, including phrenic and intercostal muscles when involved.
- Subdivision E. involvement of the seventh nerve only.
- Subdivision F. Alpha. encephalo-bulbo-spinal disease
  - Beta. encephalo-spinal; encephalo-bulbar; bulbo encephalitic; bulbospinal.
  - Gamma. Peripheral neuritis only; cortical involvement only, hemiplegia only.
  - Delta. Landry's disease.

Patients in groups 1 to 4 inclusive usually recover within the isolation period of 21 days and are discharged from the Contagious Hospital as completely cured. Those in group 5A need but little more time to recover complete function and require scant physiotherapy after discharge. Years ago, it was rare that patients other than those with paresis or paralysis of the muscles of the trunk or extremities ever got into a hospital. In communities where they have become conscious of poliomyelitis, many abortive, non-paralytic, and slightly paretic patients are now recognized. In our own experience, these were never less than 20 per cent of the patients admitted in epidemic years; in some epidemics they might even rise to 35 per cent. The meningeal reactions, positive Kernig sign, stiff back and neck and relaxed neck, now referred to as spasm of the hamstrings, back and neck muscles disappeared in 43 of the 226 patients (1941 epidemic) in groups 3 and 4, the so-called non-paralytic patients in from 2 to 22 days, the average being 11 days.

Patients in group 5 who in addition to other signs, such as meningeal irritation, etc. have

paresis or paralysis and are admitted to the hospital are the patients that need good physiotherapy.

There is some discussion about the future conditions of the type of patient in group 5A. Some individuals leave the impression that many crooked backs, etc. will result if not treated by this or that therapy. That patients with poliomyelitis and weak back muscles may slip unrecognized through a clinic is quite probable. There are always mistakes of omission but these are usually few indeed. In our 1941 series of cases, there was one such out of 226 admissions.

In a report on results, patients in groups 1, 2, 3, 4, 5D Alpha and 5F Gamma should be recognized and kept separate, since such patients recover with a minimum of attention and no fancy treatment is necessary.

Patients in group 5 must be subdivided since certain types of paralyses may cause distinctive and characteristic clinical pictures.

Most of the deaths from infantile paralysis occur in types 5C and D. In the latter types (the bulbar), mucus collects in the throat and drifts to the back of the pharynx. Patients are unable to cough it out and it gets into the trachea and bronchi. The patient gets blue; he can go through the motions of breathing but he cannot get air into the lungs; he begins to choke and may even suffocate. He then makes himself worse by taking shallow breaths or holds his breath. When he finally gets into a state of air hunger and can no longer refrain he takes a deep breath, insufflates the mucus into the trachea and has an attack of extremely difficult breathing, coughing and cyanosis. The immediate results obtained in these patients by postural drainage and mechanical aspiration are truly remarkable.

It is illogical to expect any results from external treatment in patients who have bulbar poliomyelitis only. General supportive measures and good nursing care are all that are necessary. If they live 48 hours, they usually survive. Consequently, no one can claim particular credit for recovery because of any therapy.

Patients in 5C, those with respiratory muscle palsies, require the aid of a respirator. Not all poliomyelitis patients with respiratory distress need the respirator. It is contraindicated in bulbar poliomyelitis unless there is a combined bulbospinal (respiratory) lesion. It is only those that have paralysis of the intercostal and diaphragmatic muscles who must have its help.

What worries the doctor and patient is the muscle paralysis. Therefore, beneficial effects of therapy must be demonstrated in these patients. The ultimate objective of any therapy should be to ascertain whether as a result of treatment any one of the groups described under 5 could be taken out of this group and be placed in a lower subgrouping. Such an objective test is a severe one but it soon teaches us a sense of proportion for we find that many patients in group 5 will remain in 5 even after therapy if we stick to our definitions. Such objective analysis, if final, would be too severe, however. It would not give information as to the condition of the individual as a whole nor the degree of betterment. The fact that a patient would remain in group 5 and still be paralyzed would not signify that he is *not better*. This bare classification does not gauge the results obtained by some workers, i.e., the ability to execute synchronous movement even though the muscles are weak; nor does it indicate the degree of passive mobility, the absence of flail joints, the absence of deformity, etc. In brief, if too much opposition is not employed, an individual may have obvious weakness of both agonist and antagonist muscles and yet execute complicated movements with ease and skill. Such patients may be completely lax and their muscles passively movable in all arcs. They have neither muscle contraction nor deformities. Such a patient has had great improvement.

It may be true that passive mobility in itself is of no direct aid to motion and that an easily movable group of muscles may be completely useless. On the other hand, it is known that mobility is a precursor of synchronous motion and that contraction of any kind prevents or hampers movement. Nevertheless, it is quite possible that passive mobility may be of little use to the patient if the muscles are still completely paralyzed. If this be so, the question is whether muscles should be allowed to remain passively relaxed or whether it might be better in some instances to get the arm, ankle, etc. fixed and ankylosed or splinted in positions of greater mechanical advantage. This, however, is a subject for orthopedic attention and not pertinent to the present paper.

We have divided the disease into groups, but in order to obtain further information as to actual benefits accrued, it is necessary to make most accurate comparisons. We must also divide patients according to their status of recovery as follows.

Status I. Those with neither weakness nor

paralysis. They have normal passive mobility in all arcs. If the patient is found to be in this status following the course of treatment, he is regarded as 100 per cent cured.

Status II. Those who have complete functional cure. There is a minimum of hidden weakness, only detected by careful examination against force. The muscle strength is approximately from 70 to 90 per cent efficient and there is complete passive mobility of all muscles. A patient in this status following treatment can be regarded as a complete functional cure.

Status III. These are patients who have slight paralyses of the muscles of one extremity and perhaps severe paralysis in another. They may have paralysis in individual muscles whether the disease is bulbar or spinal. The muscles are usually from 40 to 60 per cent efficient. There is functional motility with the aid of the observer or with braces and complete mobility of muscles.

Status IV. These patients have severe paralyses of the muscles of two or more extremities. Function is limited and muscle power is only from 10 to 40 per cent efficient.

Status V. These patients are bedridden and have involvement of the muscles of all extremities and others as well, the efficiency of which ranges from 0 to 10 per cent.

Status VI. Those who die.

Not all individuals will progress from one status to another even with treatment, but most patients will show obvious improvement *within a status*. For example, an individual in status IV may still have paralysis at the end of observation, but he may nevertheless have functional ability, be passively mobile and have no contractures, no flail joints, etc. Or a patient may show improvement in one or more muscles or muscle groups, but still have marked involvement of other muscles or in other extremities. Such an individual has improved nevertheless. Such improvement must also be expressed and to do this each status must be divided into three subdivisions.

(a) Those individuals who have shown minor improvement of function and strength (from 10 to 20 per cent) and have passive mobility.

(b) Those individuals who have shown great improvement in function and strength in some muscles (about 50 per cent) and have passive mobility.

(c) Those individuals who have marked imimprovement in function and strength in some muscles and have passive mobility without contractures, but who still have obvious residual weakness at the end of an observation period which prevents them from being included in a higher status.

There are arbitrary ways to measure improvement such as measurements of individual or group muscle strengths, estimation of muscle strength of the patient as a whole, estimation of individual members—arms, legs, etc., and estimation of individual muscle strength.

The practitioner and patient are interested in knowing something of the patient as a whole. It is in this sense that we have divided our patients into the groups as outlined—groups who were completely cured, who had great improvement, who had but moderate improvement, those who had slight improvement and those who died.

No method of estimation is altogether accurate, and the personal equation has at times probably entered in the estimations made by our house staff. Yet sample checking by myself, associates and physiotherapists have been in surprisingly good agreement.

This system of evaluation indicates the patient's condition as a whole and also takes into account minor improvements in individual muscles or muscle groups as well as major advances in entire extremities or in the complete organism.

It seems simple enough to formulate a set of rules and to make our judgements fit each rule. Unfortunately, infantile paralysis is like any other disease. There are imponderables which must be considered when speaking of therapy, for the very existence of some conditions accelerate and in some instances militate against recovery.

Good results depend not only on treatment but on (1) the length of time the patient is under absolute control, (2) the length of time the patient can be kept from using weak muscles contrary to and against gravity, (3) the age of the patient, (4) his intelligence quotient and (5) his willpower to get well. Infants who recover sufficiently to climb around the crib may develop substitution and deformities. Recovery in the patient who does not understand what is wanted, in the lazy individual and in the spoiled child is difficult. The adult who insists on walking too

soon despite adverse advice, the one who demands his release in the midst of treatment and the person who cannot be kept in bed and controlled because at the moment he is satisfied to move no matter how incorrect his movements, are the patients who have poor results and possible deformities, which are not the fault of any therapy.

Early treatment will not cure everyone. Nor should the proponents of treatment be willing to promise complete cure, for there is no treatment ever described that can accomplish this result in all patients.

Complete recovery can be claimed if the patient can put his muscles to the same average use as he did prior to having had an attack of the disease.

Some therapists go beyond our criterion of complete recovery and by persistent muscle training produce a litheness in an individual little short of acrobatic, a nice but unnecessary suppleness for a plantegrade animal, a suppleness which will be gradually lost as the patient starts walking again unless he persists in this super and unnecessary training.

There is no doubt but what patients treated this way appear startlingly mobile to the unthinking examiner, but if he stops to reflect, he will soon remember that such conditions are not approximated in the average person, including himself and the patient.

Practically all of our time has been spent in showing that poliomyelitis is not only a disease causing paralysis in patients, but a disease which may not cause paralysis. We need not spend too much time on results published elsewhere (22, 23). However, with the background presented one table can now be examined from our last article, which considers in detail the important reported statistics that can be analyzed and classified according to our definitions. It is soon found that the number of complete cures in those patients who have had objective paralysis is not very high with any method of therapy. The highest percentage is 23.8 of complete cures (Pohl-Kenny) as compared with 21 of our own. If we were to include patients that had very marked improvements and who executed synchronous movements without distortion, it would be found that recovery rate with the Pohl-Kenny treatment was 47.6 per cent, while ours was 40.5 per cent. In analysis, a reference to our article will show we have been lenient in an estimation of credits due the Pohl-Kenny treatment. It also must be pointed out that the Pohl-Kenny report is based on 21 patients, while ours includes 138. When we included non-paralytic patients as complete cures, we found that the Pohl-Kenny rate was 38.4 per cent and ours 40.1 per cent, the former figures being based on 26 cases in the Pohl-Kenny treated group and 226 in our own.

Our results are comparable with those of Kenny and better than many others reported and which we analyzed. However, I am not certain that they are better than those recently reported by Lenhard of Baltimore (24).

Do I feel that Sister Kenny obtains good results?

End Results after Treatment in Various Clinics

	Toomey	I Pohl-Kenny	IIA Daly	IIB Daly-Kenny	III Stone	IV Kabat-Knapp
	percent	*percent*	*percent*	*percent*	*percent*	*percent*
Complete cures	21.0	23.8	0	4.7	18.1	0
Advance of one or more statuses	19.5	23.8	5.5	14.3	9.1	15.0
Advance of one or more statuses plus cures	40.5	47.6	5.5	19.0	27.2	15.0
Improve to A	12.2	36.3	17.6	23.4	0	46.4
Improve to B	36.6	36.3	17.6	64.9	0	29.4
Improve to C	37.8	27.4	11.8	11.7	100.0	11.7
No improvement	0	0	52.8	0	0	11.7
Total number of cases in series	226	26	43	28	11	20
Total number of cases considered in evaluation of treatment	138	21	18	21	11	20
Per cent of deaths in entire group	7.5	0	0	0	0	0
Per cent of complete cures including nonparalytic cases and 5D alpha and 5F gamm	40.1	38.4	7.1	10.7	18.1	0

I once thought that her treatment was better than mine until I found that some of her patients, who at first I thought were paralyzed were merely non-paralytic. She has an excellent knowledge of muscles and her meticulous method of muscle reeducation gives her good results. But good results have also been obtained by others.

The patients of Sister Kenny whom I have seen had neither deformities nor flail joints. They were happy. Their muscles were completely relaxed and could be rotated passively through their normal arcs. The same is true of our own patients. In the future, if splints are not employed in patients who are still paralyzed in spite of long and continuous physical therapy and muscle exercises, the outcome will be problematic. I could hardly agree that splints are not necessary at this stage. There is a limit to improvement with physiotherapy. Beyond that one must face the issue of residual paralysis and seek aid from the orthopedic surgeon.

CONCLUSION

1. As first shown by Feiss, immobilization and splints are unnecessary in the acute stages of poliomyelitis.

2. Active movement, manipulation, etc. in the acute stage of the disease do not harm the patient.

3. Some form of heat should be used to bring about vascular dilatation in the early stages of the disease. The muscles should be moved through their normal arcs.

4. Muscle reeducation plays the most important role in poliomyelitis therapy. It should be started early and should be persistently carried out over a long period of time.

SUPPLEMENTARY NOTE

I have referred to the method of physiotherapy as the Toomey-Feiss method. This hyphenated descriptive term is used for convenience only and not to imply that the authors have discovered a new form of physiotherapy. All the modalities and methods of treatment employed have been occasionally used by others. What may be new is the fact that a form of early therapy has been consistently employed at City Hospital, Cleveland for at least 20 years and that enough data has been accumulated to give our way of treatment some standing in the care of infantile paralysis.

In the present and in a previous article (21), I have used the term "segmental" to distinguish central involvement in poliomyelitis from peripheral involvement in peripheral neuritis.

Anterior horn cells might be grouped as segregated aggregates serving as muscle cell nuclei, involvement of which would give a radicular or nuclear lesion. Thus, if there is paralysis of muscle groups having the same radicular innervation, the lesion would be localizable to the spinal cord and not the periphery. "Radicular", however, is a poor term of designation; nor is "spotted" accurate, since it makes one think of multiple sclerosis.

The term "segmental" is loosely used by clinicians to denote roughly the levels of the cord involved in a disease.

McCouch of the University of Pennsylvania objects, and correctly so, to the use of the word "segmental" in the present instance, since the term is wholly indefensible from a physiologist's viewpoint. Actually, all that one is justified in saying under the circumstances in question is that a *cord* lesion is present and were it lower motor neuron in character, it could be localized in the anterior horn cell area.

BIBLIOGRAPHY

1. Toomey, John A.: Effect of Infrared Heat on Localized Poliomyelitis and Neuritis. J. Ped., **22:** 135, 1943.
2. Toomey, John A., and Lipson, Harry A.: Poliomyelitis. Report of a Case. Am. J. Dis. Child., **41:** 1389, 1931.
3. Toomey, John A.: An Explanation of the Mechanism of Infantile Paralysis Production in the Human Being. Ann. Int. Med., **8:** 854, 1935.
4. Toomey, John A.: The Gastrointestinal Portal of Entry in Poliomyelitis. J. Ped., **8:** 664, 1936.
5. Toomey, John A.: Accelerated Production of Poliomyelitis. Proc. Soc. Exp. Biol. and Med., **31:** 1015, 1934.
6. Toomey, John A.: Experimental Production of Bulbar Poliomyelitis. Proc. Soc. Exp. Biol. & Med., **32:** 628, 1935.
7. Toomey, John A.: Poliomyelitis II. The Bulbar Type. Am. J. Dis. Child., **50:** 1362, 1935.
8. Toomey, John A.: The Seventh Nerve as a Possible Pathway for the Transmission of the Virus of Poliomyelitis. Am. J. Dis. Child., **51:** 58, 1936.

9. Toomey, John A.: Round Table Discussion on Poliomyelitis. J. Ped., **7:** 280, 1935.
10. Sabin, A. B.: Pathology and Pathogenesis of Human Poliomyelitis. J.A.M.A., **120:** 511, 1942.
11. Schwartz, R. Plato, and Bouman, Harry D.: Muscle Spasm in the Acute Stage of Infantile Paralysis as Indicated by Recorded Action Current Potentials. J.A.M.A., **119:** 923, 1942.
12. Moldaver, J.: Physiopathologic Aspect of the Disorders of Muscles in Infantile Paralysis. J.A.M.A., **123:** 74, 1943.
13. Watkins, A. L., Brazier, M. A. B., and Schwab, R. S.: Concept of Muscle Dysfunction in Poliomyelitis, Based on Electromyographic Studies. J.A.M.A., **123:** 188, 1943.
14. Zucker, Edward M., Kohn, Paul M., and Toomey, John A.: Muscle Potentials in Poliomyelitis. In preparation.
15. Toomey, John A.: The Intestine and Urinary Bladder in Poliomyelitis. Am. J. Dis. Child., **45:** 1211, 1933.
16. Toomey, John A.: Reactions of Patients with Infantile Paralysis to Autonomic Drugs. Am. J. Dis. Child., **47:** 573, 1934.
17. Feiss, Henry O.:
    a. Experimental Studies of Paralyses in Dogs after Mechanical Lesions in their Spinal Cords, with a Note on "Fusion" attempted in the Cauda Equinas of the Sciatic Nerves. J. Compar. Neurol., **22:** 99, 1912.
    b. The Treatment of Early Infantile Paralysis as based on the Physiologic Indications. J.A.M.A., **78:** 85, 1922.
    c. Early Activation of Muscles in Infantile Paralysis. Ohio State M. J., **19:** 177, 1923.
    Toomey, John A.:
    d. Immobilization in Infantile Paralysis. J.A.M.A., **119:** 438, 1942.
18. Toomey, John A.: (Demonstration of Results).
    a. Pediatric Section, Cleveland Academy of Medicine, Oct. 22, 1930; Oct. 14, 1931; Dec. 15, 1932; Nov. 15, 1937.
    b. Ohio State Nurses Association, Nov. 1, 1934; Nov. 12, 1937.
    c. Cleveland Nursing Center, Oct. 26, 1932.
    d. Ohio State Medical Association: Findlay, Ohio, Oct. 28, 1939; Cambridge, Mass., Nov. 9, 1939.
    e. American Academy of Pediatrics: New York City, June 3, 1941; Cleveland, Ohio (Region III), May 14, 1942.
    f. Columbus Academy of Medicine, Columbus, Sept. 22, 1941.
    g. Iowa State Pediatric Society, Des Moines, Ia., April 14, 1942.
19. Hines, H. M.: Effects of Immobilization and Activity on Neuromuscular Regeneration. J.A.M.A., **120:** 515, 1942.
20. Gutmann, E., and Guttmann, L.: Effect of Electrotherapy on Denervated Muscles in Rabbits. Lancet, **1:** 169, 1942.
21. Toomey, John A.: Poliomyelitis: I. Basic Considerations needed for Judging Therapeutic Results. Am. J. Dis. Child., **66:** 635, 1943.
22. Toomey, John A. and Kohn, Paul M.: Poliomyelitis: II. Results of Treatment during the Acute Stages of the Disease. Am. J. Dis. Child., **67:** 393, 1944.
23. Toomey, John A., and Kohn, Paul M.: Poliomyelitis: III. An Analysis of Results following Treatment. Am. J. Dis. Child. In press.
24. Lenhard, Raymond E.: The Results of Poliomyelitis in Baltimore. J. Bone and Joint Surgery, **25:** 132, 1943.

Doctors on Board the Motorship Gripsholm

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ON THE first Repatriation trip the M. S. Gripsholm brought back 41 doctors and 30 nurses from the Far East. In the second trip which ended in New York December 1, 1943 there were 42 repatriated physicians of whom 25 had been connected with missionary hospitals. Of these there were eight Presbyterians, six Methodists, four Baptists, three of the American Episcopal Church, one of the American Board (Congregational), and one each from Lingnan University, the Salvation Army and the Seventh Day Adventists. Nearly all of the doctors were members of the Chinese Medical Association and a large proportion of them had membership in the American Medical Association.

There were 64 nurses on board, 41 of whom came from mission hospitals and there were eight dentists. All of the doctors had been located in some part of occupied China or the Philippine Islands and were picked up at the ports of Shanghai, Hongkong and San Fernando in the Philippines.

In response to a suggestion received from Dr. E. H. Hume the doctors and nurses met together in the saloon of the M. S. Gripsholm on four occasions to discuss their experiences of the last two years.

At the first meeting Drs. H. H. Loucks, T. B. Dunn, A. V. Greaves and C. H. Leach described briefly general sanitary and medical conditions of the Camps in which British, Americans and Dutch had been interned by the Japanese Consular authorities at Weihsien, Shantung; Shanghai, where there were eight separate camps; Stanley in Hongkong and Santo Tomas in Manila. These were called Civil Assembly Centres and are to be distinguished from military prisoner camps.

At Weihsien there were epidemics of gastro-intestinal disease. Cases were also reported of typhus fever, appendicitis and other surgical conditions and skin infections.

At Shanghai and Hongkong there were reported cases of malaria and deficiency diseases such as Beriberi, etc.

In Hongkong and Manila there was a striking absence of pneumonia and other respiratory diseases although many of the internees were without sufficient clothing or bedding during the colder weather. In Hongkong dysentery was prevalent, but was chiefly of the Flexner bacillary type, while in Manila the Amebic form of this disease was not uncommon.

The second medical meeting on board the steamer was devoted to the consideration of Deficiency Diseases and Nutritional Disturbances as observed in the Internment Camps. There were four addresses as follows:

Dr. W. H. Adolf of the Weihsien Camp.
Dr. Josephine Lawney of the Chapei Camp in Shanghai.
Dr. Hugh Robinson of the Santo Tomas Camp in Manila.
Dr. A. V. Greaves of the Stanley Camp in Hongkong.

It is hoped that the findings reported at this meeting may be published in full at a later date.

A third meeting of the doctors and nurses was held on board at which Drs. Crawford and Wiley of the Gripsholm's medical staff spoke of recent developments in medical practice in the United States and especially registration in the medical war services of the country. Recent developments in the use of new drugs and new surgical devices were described. Inasmuch as all the repatriates had been without any news from home for over two years this meeting proved to be of especial interest to all.

Finally a fourth meeting was held, primarily for the missionary doctors and nurses. A small committee had been called to report on the condition of hospitals and medical schools in occupied China and also to draw up resolutions to guide us for future medical work after the war.

REPORT ON CONDITION OF HOSPITALS IN OCCUPIED AREAS OF CHINA FROM MUKDEN TO CANTON

Total number of Hospitals reported on	89
Reported open and in use as a hospital	47(53%)
Reported as closed	37(42%)

Old building closed but staff carrying on elsewhere	1
Old buildings used as Japanese military hospital and former staff carrying on elsewhere	2
Old building destroyed, but hospital carried on at a new site	1
Old building occupied and used as a Japanese civilian hospital and Chinese staff carrying on elsewhere	1

} 5%

Condition of the Property in 43 Hospitals

Looted but still open	20
Looted and closed (often 100% looted)	20
Destroyed	3

Control of the Hospital as Reported in 55 Cases

Under Chinese Control	a. Christian	19
	b. Civilian	4
	c. Government	8
Under Japanese control	a. Civilian	19
	b. Military	5

Nurses Schools as Reported from 56 Hospitals

Schools open and running	20
Schools closed	20
Hospital never had a school	16

Kind of Patients Admitted as Reported in 46 Hospitals

a. Patients Chinese	Civilian	40 hospitals
	Military	1 hospital
b. Patients Japanese	Civilian	1 hospital
	Military	4 hospitals

Nationality of Staff as Reported for 39 Hospitals

Former Chinese staff retained in whole or in part	32 hospitals
Staff part Japanese and part Chinese	2 hospitals
Staff all Japanese	5 hospitals

Six former hospitals now converted to Japanese military headquarters.

REPORT ON CHRISTIAN MEDICAL SCHOOLS IN OCCUPIED CHINA

Number of Schools operating before the war	5
Schools now operating	2
Schools closed in their site in occupied China (Cheeloo, Margaret Williamson and Lingnan School)	3
Schools transferred to free China (Cheeloo to West China and Lingnan to North Kwangtung)	2

In the two schools still operating in occupied China:
Japanese control in one (Mukden)
Chinese Christian control in one (St. John's at Shanghai)
Faculty is Japanese and Chinese in Mukden.
Faculty is Chinese in St. John's.
Students are Japanese and Chinese in Mukden.
Students are Chinese only in St. John's.

At the fourth medical meeting discussions were carried on as follows:

1. The staffing of Hospitals and Medical Schools. How to re-organize the work in the occupied areas. Drs. N. Hopkins and J. H. Daniels.

2. Better integration between the Chinese church, the Chinese and foreign community and the missionary. Drs. R. E. Stannard and H. Thomas.

3. Training of Medical Missionaries before coming to the field and on furlough. Specialists. Also the making of contacts at home with doctors and medical societies. Dr. Hyla Watters.

4. Problems of the missionary Nurse. Mrs. J. L. Young.

As a result of these discussions the following resolutions were recorded as expressing the general opinion of the missionary doctors and nurses.

RESOLUTIONS

In view of the great suffering and distress now prevailing throughout China and the appalling lack of medical facilities through the closure, looting and destruction of hospitals and medical schools and the scattering of their staffs we urge that every possible effort be made to rehabilitate the medical work as soon as possible after the war.

I. The Relative Importance of Different Phases of the Work:

Because of the relative importance of different aspects of the work it is recommended that emphasis be placed in the following order:

A. Acute relief work, using non-professional men and women as far as possible and the utmost cooperation with government and public health agencies.

B. The re-establishment of mission medical schools.

C. The re-establishment and re-opening of the hospitals which have been closed always conserving their ultimate Christian basis and control.

II. Chinese Leadership: This should be given increasing emphasis in the control through local boards of directors and administrative positions, promoting local cooperation of the church and com-

munity for the matter of health, education and financial support. The place of the foreign doctor or nurse in the mission hospital should be determined by the special needs of the case and the approval of the older members of the Chinese staff.

III. Cooperation with the central and provincial Health Organizations:

This should always be emphasized in preventive measures such as school hygiene, inoculations against infectious diseases, etc. This is of great importance to the successful operation of mission hospitals.

IV. Foreign Contributions:

We urge more liberal gifts of lives and money from abroad so that as many as possible of the now absent doctors and nurses may be sent back to the field as the way opens up for their return and that new missionaries be also sent to the field when and where the need is apparent. The prospect of subsidies being provided by the Chinese government to supplement money contributed by foreign sources is most encouraging.

V. Training of Missionaries:

While it will be necessary to make use of Chinese doctors and nurses who have not had the highest professional training it is always desirable that the missionary should have every opportunity to fully prepare for his work before going to the field and especially, as teachers in medical schools, to be equipped in some specialty.

When on furlough he should have the opportunity for graduate study. His home board in cooperation with the Christian Medical Council for Overseas Work should help him to find openings for this work in the region of this country where he is temporarily located.

VI. Publicity:

Doctors and nurses who have recently returned from the far east are the best qualified to speak on the needs of the mission field and they should be encouraged to accept invitations to address medical society meetings, church groups and members of the profession in this country, whenever their time and strength permit.

While the fact that 37 hospitals in occupied China have been closed down is most discouraging we should emphasize the fact that 47 are still valiantly carrying on though mostly under very difficult conditions; moreover in free China there are many missionary hospitals and several medical schools still functioning in a more or less normal manner. These "going concerns" will all serve as starting points for the re-opening of work that has stopped and for undertaking new enterprises.

After the close of the war we believe there will be a period of active reconstruction and growth throughout China and doctors and nurses who are familiar with the people, the customs and the languages of the country will be those best qualified to return and help the Chinese leaders in this work of rehabilitation.

Log of a Flying Visit to Central America, Mexico, and Cuba

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INTRODUCTION

WHAT follows is an attempt to condense the experiences accumulated during a visit to Central America, Mexico and Cuba so as to make them available and perhaps profitable to any interested reader.

If one travel for a month through strange and exotic countries, amid a new, luxurious and colorful vegetation, seeing new cities inhabited by new people with a different historic background from his own, living in a different climate, in houses unlike those to which he is accustomed, (in that they are architecturally designed to provide as much cool air as possible to mitigate the tropical heat, instead of providing and retaining as much heat as possible to make long winters comfortable) and engaged in occupations with which we are unfamiliar, the whole thirty days are full of novelty, interest and excitement. Indeed the impressions are so vivid, come so rapidly and are so well remembered that many hours might be spent in relating them. Moreover, when such a trip is made by air, another factor of novelty not without its own special interest is added.

Considering all these matters, the reader must be generous enough to make allowances, and not express disappointment if matters that may be of especial interest to him are but superficially dealt with and others, by which the travellers were deeply impressed are given prominence.

Our trip was made at a time of the year that might be regarded as unfortunate, for it was the vacation season, and the medical schools in Guatemala City and in Havana were closed and their faculties away. In Mexico City the school was operating, but no member of the faculty was at the school when we visited it. Thus, it is impossible to furnish accurate information about the medical schools; all that can be done is to tell what was gathered by observation and brief talks with students, clerks and a few instructors. The only official with whom we were able to talk was the Dean of the Medical School of the University of Guatemala, who finding that we were interested in leprosy, became so enthusiastic in telling us about some of his own observations and publications relative to that disease that he had no time to tell us much about his own institution.

Our journey was not one of investigation or inspection, and nothing that is said is to be regarded as authoritative.

Through circumstances that need not concern the reader, and that I have not been able to trace to their beginnings, an invitation originating with the Consejo National de Salubridad Publica y Proteccion Social, was extended to me on December 13th, 1943, by the San Juan de Dios Hospital in San Jose, Costa Rica, through Dr. A. A. Facio and Dr. Peña Chavarria, to come to San Jose, without compensation, but at their expense, and deliver "a lecture on Pathology." I was immediately filled with enthusiasm but felt it necessary to reply that I could not give "a lecture" that would be sufficiently meritorious to warrant the financial expenditure that they must make, but that I would be willing to give a course of six lectures. This was accepted and it was agreed that I should go, starting February 20th, 1944, and taking my daughter Dr. Helen Woodbridge with me. We made the trip by air, our passports, plane reservations and priorities being arranged for with the cooperation of the Coordinator of Inter-American Affairs in Washington. Dr. Albert R. Dreisbach, Mr. T. H. Englesby, Dr. J. D. Yeagley, and Mr. L. B. Kimports of that office were most helpful, and when the time of departure arrived, there being no Philadelphia Airport, we went by train to Washington to take the plane to Brownsville, Texas that night, regretting that our first flight would have to be in the dark, when we were so anxious to see everything.

WASHINGTON TO COSTA RICA

Transportation by air-plane is apt to be attended by uncertainties that cannot be foreseen but may result in unexpected disappointments just the same. When we arrived at the Washington air port to take the plane for Brownsville, we were

informed that there would be no flight that night because atmospheric conditions were reported bad. The next night it was the same and on the third night we learned that the flight would be begun, though it was doubtful whether we would get beyond Atlanta, Georgia as weather conditions further west were still reported "bad." It is true that this delay gave us two unexpected days for sight-seeing in Washington, but it delayed our arrival in San Jose, where the schedule of our lectures had been published and we were earnestly expected.

What we had been told about the weather proved to be correct, and when Atlanta was reached, the plane landed at 1 A.M., and the passengers were all sent to a nearby hotel to sleep the rest of the night. By morning weather conditions were reported favorable, and we flew away from Atlanta at an early hour in the morning, congratulating ourselves that now we should be able to look down upon those parts of Georgia, Alabama, Mississippi, Louisiana and Texas over which we were to fly. But a few miles beyond Atlanta, the plane rose above a stratum of clouds that extended as far as New Orleans, and prevented any view of the earth below. It is true that what we saw was beautiful. We realized the truth of the old saying, "beyond the clouds the sun is still shining", for from a perfectly clear blue sky above, the sun shone dazzlingly upon the upper surface of the stratum of white clouds so that dark glasses became indispensable. What was seen from the windows of the plane suggested an arctic sea covered with ice and snow. It was almost perfectly level, though not perfectly smooth. At long intervals occasional masses of clouds projected upward like vast ice-bergs. Through occasional rare openings in the clouds we could glimpse the earth below, dull and sunless because in the shadow of the clouds. The further we went the more numerous these openings became until at length the cloud bank was passed and we looked down upon the eastern part of Texas from a height of about five thousand feet.

It was level country, beset with little towns and villages and divided up into orchards and fields. We passed within short distances of cities such as Austin and Houston, but saw practically nothing of them. Late in the afternoon Brownsville was reached, and we put up at the Travellers' Hotel to await the next day's flight and to undergo the various formalities connected with passing the frontier into Mexico.

The next morning we changed from the Eastern Airways to the Pan American Airways and took off for Guatemala City, which was the goal of the day's flight.

We had looked forward to this part of our journey with great anticipation because of the varied and imposing scenery we had somehow come to expect, but we were doomed to disappointment, for shortly after getting started, the plane took a southeasterly course and flew over the waters of the Gulf of Mexico, almost or entirely out of sight of land, and then turning inland, flew again over another bank of white clouds until the great lake of the central plateau was reached, when we suddenly passed the clouds and saw the new country like a relief map below us, with all of its irregularities of surface and color exposed.

There was not much variation in color, which, to our surprise, was not green but greenish brown or "mud-colored." This seemed to be because we looked directly down upon it and saw the earth everywhere, even between the trees and crops growing in it. In the same way, the rivers and lakes did not reflect the sky—blue and white—or the shores—green, but we looked directly through the water to their bottoms, which were "mud-colored." That made it sometimes impossible to tell what was a river and what a winding road. But the altitude made it possible to see at a glance a whole mountain range, to trace a river for a hundred miles among its hills, and to see how a wrinkle upon the earth's surface had been eroded into innumerable valleys, canyons, gorges, and ravines by the water courses, some now dry, some still flowing into the principal river.

The plane landed at Mexico City, for a short time, to refuel, then off again for the end of the day's flight at Guatemala City, as has been said, but again the clouds embarrassed us, and again we took to the sea, flying along the shore of the Pacific Ocean.

Guatemala City was reached late in the afternoon and we put up at the Palace Hotel, where we were well treated and well fed. We left next morning for our final flight to San Jose, Costa Rica, where we arrived shortly before noon, and were welcomed at the airport by our friends.

Now that I once more have both feet securely on the ground, I realize that like the atmosphere, through which I had flown sometimes at an altitude of sixteen thousand feet, my thoughts and experiences had expanded until I could no longer easily confine them within reasonable limits, but had spread my description of them over twice the

number of pages that I intended them to occupy when I began.

I shall have to watch myself carefully lest I yield to every impulse prompted by vivid and delightful memories, and be upon every subject as prolix as I have been about travelling by air.

COSTA RICA

Costa Rica is a lovely and picturesque country. The border between it and the republic of Nicaragua on the north, runs east and west, one half of it along the shore of Lake Nicaragua. On the east and west Costa Rica is bounded by the Caribbean Sea and the Pacific Ocean, respectively, the shores running north-west and south-east. As the Pacific coast line is considerably longer, (300 miles) than the Caribbean (100 miles), the southern boundary that separates Costa Rica from the Republic of Panama runs almost directly north and south (100 miles). Each coast-line has a range of high, sharply pointed volcanic mountains, a few of which are still active. Between the mountain ranges the country is a plateau about 3000 feet in altitude, where the soil is rich and especially adapted to the cultivation of coffee, which is the chief crop and is said to be the best in the world. Between the mountain ranges and the oceans the land is low, humid, and very hot, as compared with the central plateau, and there bananas, coconuts and sugar cane are grown. A railroad crosses the country, at about its center, from Puerto Limon on the east to Puntarenas (150 miles) on the west, passing through San Jose the capital city in the exact center of the country, with a population of about 68,000.

Three volcanoes are visible from San Jose, all on the Caribbean side, and are known as Irazu (11,322 feet), Poas (8,895 feet) and Turrialba (11,350 feet) respectively. On a fine day, it is possible to see the Atlantic Ocean (Caribbean Sea), the Pacific Ocean and Lake Nicaragua from the summit of Irazu. Other volcanoes are scattered here and there. The country is subject to earthquakes, which are usually not severe.

The "New World Guide" says of Costa Rica, "Essentially Costa Rica is a nation of small farmers, with about 85,000 persons holding some 200,000 parcels of land, with the problem of excessively large estates yet to show itself to any appreciable extent under modern conditions except in the case of large coffee plantations and foreign owned banana plantations."

In passing it may evoke a smile when we remember that this tiny country with a population of little more than half a million persons, and whose national army numbers only 100 soldiers, declared war upon Japan the day after the occurrence at Pearl Harbor, and before the United States had done so!

The small size of the country and its sparse population largely devoted to similar agricultural pursuits, give the people many common interests and enable them to enjoy wide-spread acquaintance with one another. They take great pride in the preponderance of Spanish over Indian ancestry among them, that enables the country to be ruled by the better educated elements of the people. Nevertheless, elections are hotly contested and preceding one that was held just before our arrival, almost every house showed a large placard bearing the name and sometimes the picture of the preferred candidate. We found those who lost, although unable to conceal their disappointment, were without resentment and had no idea of revolutionary action.

Public education is universal and every village has its conspicuous and sometimes handsome school houses. Teachers are held in high esteem. English is taught in all of the schools.

For higher and especially professional education the youth are usually sent to the United States or to Europe. Among the medical men to whom we were personally introduced were some that had either graduated from or studied at Paris, London, Berlin, Leipzig, Heidelberg, Brussels, Leyden, Harvard, Pennsylvania, Tulane, Minnesota and Johns Hopkins. They were mostly young or middle aged men, fully abreast of the times, and well-prepared to practice their specialities. They have as yet no established medical or dental schools of their own, though there is the foreshadowing of one of each at the University of Costa Rica in San Jose, where buildings are being erected in anticipation of future activity.

With such a group of well-trained doctors, and with the United Fruit Company having plantations and ports both on the Caribbean and Pacific coasts where the land is low and malaria and other tropical ailments always present, it is small wonder that there should be numerous hospitals.

Let no one residing in our northern republic imagine that because Costa Rica is a small state rarely contributing to the news of the world, it is to be looked upon disdainfully or patronizingly. That is a wide-spread human error among nations as among individuals where the rich and powerful

disdain and patronize the weak and poor, who are apt to be better than they.

Although not a practitioner of any of the healing arts, my half century as a pathologist has caused me to have been connected with a dozen Philadelphia hospitals including some of the largest and some of the smallest. It was inevitable that I should become acquainted with the members of the staffs of each of them, see them at work, sometimes see their patients in the wards and clinics, and finally have many of their melancholy failures come under my knife at the autopsy table. I thus acquired a fairly good idea of hospitals as well as the ability to sort the good from the bad. In my own city there were both.

In Costa Rica I visited the San Juan de Dios Hospital, the Asilo de las Mercedes (a leprosarium some miles away), the Sanatorio Antituberculoso Duran (a tuberculosis sanitorium), walked about and studied the buildings and gardens of the Asilo Chapui (a hospital for the insane), and was flown over to the Pfficific coast to see at Golfito a new hospital conducted for the United Fruit Company.

The San Juan de Dios Hospital, under the medical direction of Dr. Peña Chavarria, is an institution with 1500 beds, all of which were occupied. Evidently it was too small and many cases (250 daily) were treated in the outpatient clinics that should have been in bed in the wards. This hospital is near the center of the city and consists of two-story buildings connected by arched colonades and is so arranged as to have numerous open spaces partly surrounded by cloisters filled with flowering plants, palms and other trees. All of the floors, including those of the cloisters, are paved with polished and waxed red tiles and are perfectly clean. The wards admitted of no criticism. Every patient was clean, in clean white clothing, and in a clean white bed!

I went into some detail concerning the auxiliary departments—x-ray, laboratory, kitchens etc. —and found them modern and complete in every respect. The laboratory under Dr. Marcia L. Fallas could not have fallen into better hands, and performs a great amount of work. Four graduate exchange students, all from prominent medical schools in the United States, and sent to this hospital to study tropical diseases, seemed perfectly satisfied with everything they saw.

It was in the auditorium of this hospital that our lectures were given on consecutive evenings from 8.30 to 10 P.M. Most of those attending were members of the hospital staff, though a few came from neighboring cities. They were enthusiastic in their interest and more were present at the last than at the first lectures.

The lectures were given in English, which everyone seemed to understand. Three lectures were upon "The Fundamental Principles of Inflammation," and three upon "The Beginnings and Growth of Tumors." My daughter Dr. Helen McF. Woodbridge gave one lecture upon the "Bacteriology of Inflammation" in amplification of the principles I laid down.

The Asilo de las Mercedes is a leper hospital some twenty miles from San Jose at the foot of the mountains. It has some three hundred patients who are cared for in a number of connected buildings by the Hermanas de la Caridad de Santa Ana (Sisters of Charity of Saint Ann). It was explained to us that the entire hospital was soon to be rebuilt and that in the meantime unnecessary repairs were not being made. Be that as it may, the institution appeared to be neat and tidy, absolutely clean, and the patients remarkably cheerful and comfortable. No one having met the tiny Sister Superior—Sister Maria Bernal—could be surprised at that, for her sweet face, kindly disposition, sympathetic manner and indefatigable energy made her a tower of strength among the miserable and often helpless people among whom she works and for whom she prays. She is one of the most unforgettable characters I have ever met.

Treatment in early cases, and such advanced cases as are thought to be capable of benefit, is by intramuscular injections of the ester of chalmugra. No cases have thus far recovered.

The Duran Tuberculosis Sanitarium is under the management of Dr. R. Blanco Cervantes, who impressed me as a good doctor and excellent manager. It is a beautiful, new and up to date institution with excellent buildings containing every modern device for the study and treatment of tuberculosis. Having been at one time pathologist to the Rush Hospital for Consumptives and at another time to the Henry Phipps Institute in Philadelphia, and having spent nine months as a patient in the U. S. Army tuberculosis sanitarium at Oteen, near Asheville, North Carolina, I feel competent to judge the merits or demerits of such institutions. I speak of this one with unstinted praise.

It occupied a peculiar and, it seemed to us, a dangerous position on a small plateau about two

thirds of the way to the summit of the active volcano Irazu.

The automobile ride of about thirty miles from San Jose to the summit of Irazu is a beautiful one that first passes through coffee country, and then through pastural and farming country. The towns of Tres Rios and Cartago are traversed on the way.

A visit to the volcano is a popular Sunday outing, and one after another motor cars, loaded with happy people carrying lunches, follow an excellent highway that enables them to reach a point only a few hundred yards from the crater, walking to the edge of which one can look down into a great repulsive depression barren of every green thing, and gullied all around by the vertical channels down which rain has washed the gray volcanic tuffa into grooves. A small pond occupies one side of the crater, while on the other there were three openings from one of which as much steam continually escapes as an overcharged locomotive boiler might emit through its safety valve.

Having learned that Irazu now and then belched out quantities of mud and rocks, we expressed surprise that a hospital should have been built on its shoulder, when there were so many other safer places. The answer amused us: "Oh, when it does that, the mud and rocks always fly over us, they never hit us!" What if sometime they should?

The hospital for the insane I know only from the outside. I know nothing about insane people, and, frankly am more or less afraid of them, so that I had no desire to go in. I can only say, however, that the beautiful new building looked all right from the outside, and that it stood in several acres of the most beautiful garden in San Jose—one that was a kind of Paradise of bougainvilla vines, hibiscus bushes, magnolias, oleanders, royal palms, sago palms, palmettos and other tropical vegetation, the names of which I did not know.

To Golfito we were taken in a small air-plane, by our genial and distinguished host, Dr. Antonio A. Facio, the chief surgeon to the United Fruit Company in Costa Rica, the chief surgeon of the Pan American Airways of Costa Rica, the chief surgeon of the San Juan de Dios Hospital, and many other "chief" things. He was good enough to entertain us at his beautiful home during the ten days of our stay in San Jose, and made it his ambition to have us see everything in and about the city, taking us for daily rides in his motor car, introducing us to his family and friends, entertaining us at the Country Club of San Jose and going to endless trouble for which I am under the greatest obligation to him.

Golfito consists of little more than the shipping docks, the hospital, the houses that accommodate the families of the members of its staff and a few houses for workers. It gave me the impression of being temporary rather than permanent, but that may be on account of the lightness of the materials used in the construction of buildings in a country subject to earthquakes. When it was remarked that many of the red tiles so universally used for flooring in Costa Rica were broken we were told that it was the result of recent slight earthquakes. The hospital is beyond adverse criticism and is staffed by excellent men, all of whom are salaried —there is no population to practice on in Golfito, —and most of whom are foreign to the neighborhood, some from the United States.

But all good things have to come to an end, and after ten days in San Jose, at the home of Dr. Facio, I took farewell of the medical group with sincere regret. These words with which I bade them farewell were received with prolonged applause, "I came among you in some doubt as to how I would be received and whether what I had to say would meet with your approval. You opened your arms, took me in, showed me the greatest respect, listened with interest to what I had to say, and won my affection and regard. I am sorry to go, and in so doing, I leave you my heart! Adios!"

Dr. Carlos Saenz Herrera, the President of the College of Physicians, paid me an official farewell visit. To give you an idea of the honors heaped upon us I may mention that on the day of our arrival we were the guests of the Rotary Club at dinner; a ball was held in our honor, and the Dental Faculty gave us a large "cocktail party."

We were both made Honorary Members of the Odontological Society of Costa Rica, and I was also made an Honorary Member of the Medical and Surgical Faculty of Costa Rica. But the greatest distinction that I attained was the honorary degree of *Doctor Honoris Causa* conferred upon me by the University of Costa Rica, through its Rector, Alejandro Alvaredo Quiros.

I wish that I could mention by name all those from whom I received many touching kindnesses, but space does not permit me to do so. Should any one of them ever see this writing, let him not

feel that because he is not personally mentioned in the text I fail to appreciate his courtesy to me.

COSTA RICA TO GUATEMALA

Our homeward journey was indirect and subject to several short stops that not only enabled us to see a number of very interesting things and places, but also made us appreciate how many more we were obliged to leave unseen until some future time for the advent of which our hopes continually increased.

We left San Jose at 12 noon on Monday March 6th 1944 under a fairly clear sky, whose scattered clouds rarely prevented us from seeing the earth below with cloud shadows here and there upon it. The plane that had taken us from Brownsville to Guatemala City had made no stop excepting at the city of Mexico, but that which took us back stopped at all of the capital cities of the Central American countries excepting British Honduras. From San Jose we flew north-west, first through the northern part of Costa Rica, then into Nicaragua and along the western shore of Lake Nicaragua to Managua, where we grounded and all got out for a twenty minute stop while they refueled the plane. Then continued north-west through Nicaragua into Honduras to Tegucigalpa, where the same thing was repeated; then west by south to San Salvador for another brief stop, then again north-west into Guatemala and to Guatemala City, which we reached at 5 o'clock in the afternoon, and where we were to spend two days at the Palace Hotel.

It might be supposed that because we stopped at three important cities en route, we must therefore, have seen more or less of them. Unfortunately that is a mistake, because the air ports are always situated several miles—sometimes ten miles—from the cities as though to prevent inspection from the air. It also seems exceptional for the plane to fly over the city at which it is to stop. So, when we were at San Salvador, no city was anywhere in sight, and we found ourselves spending our few minutes on the ground, sitting on the porch of an airport, in open country.

Our interests being inclined to geography, we found it annoying not to be able to find out when we passed from one country to another. Looking down from the plane there was very little difference in what we could see in these different states. Some seemed to be more populous and better cultivated than others, but that was likely to be because we happened to fly over mountainous regions in one, and fertile valleys in the other. They all had mountains, hills, rivers, fertile valleys and pointed mountains, that looked like extinct volcanoes. A few of the latter were shown and named on the map of the National Geographic Society that we continually used as we travelled.

One thing that exasperated us was to have seen from the window of the plane, a little volcano discharging great quantities of steam or white smoke that twisted and wreathed in a volume equal to the mountain itself, and to have no one who could tell us what its name was or over what country we were passing at the time. As we were flying at the rate of some 200 miles an hour, when an opportunity to ask the captain did arrive, we were so far away that no answer could be given.

GUATEMALA CITY

Guatemala City, beautiful, colorful, clean and quaint, is situated among beautiful surroundings, and dominated by two volcanoes, Agua and Fuego, members of a chain of eight volcanoes, the others being Acatenango, Atitlan, Toliman, San Pedro, Santa Lomas and Santa Maria.

It has many narrow straight streets, with narrow sidewalks, on each side of which are busy shops or in the residence section, long rows of uniform dwellings, usually one, but sometimes two stories high, all of different pastel tints, each with a large heavy entrance door, and one or two large windows guarded by elaborate iron gratings or "rejas." There are numerous and attractive public squares or parques. In the largest park "La Aurora," there is a zoological garden and an excellent archeological museum. About it a handsome modern section of the city, consisting of large, beautiful, modern villas surrounded by large and showy gardens, is growing.

The presidential palace is a very fine large edifice, luxurious in its appointments. An old church, El Calvario, of very novel and imposing appearance has been transformed into a national museum of history and art.

Unfortunately visitors usually feel that one of the first things to do in Guatemala City is to arrange to get out of it, and to that end find the Clark Transportation Company, with offices in the Palace Hotel, the best means of doing so. We were among such people, but justify ourselves by the extremely limited time at our disposal. The drawing attractions are Antigua, Lake Atitlan and Chichicastenango. Antigua to which we went, with its many and picturesque earthquake ruins

was once the capital of Guatemala, and contained 85 large churches and public buildings. It was frequently shaken by earthquakes, and on July 29th 1773 was almost completely demolished, so that by royal decree, the capital was removed to Guatemala City and most of the people moved away. A few of the Spaniards and many of the Indians preferred to remain, and as time has passed they have increased in numbers and have built a new and attractive city about, and partly out of, the old buildings.

We did not leave Guatemala City, however, without visiting its University and particularly its medical and dental schools. Unfortunately, as has been said, it was vacation time and students and faculty were away. The University occupies a large and imposing group of orange yellow buildings surrounded by gardens rather than a campus. The medical building was plain, dignified, commodious, with an imposing staircase to the second floor. It has outside colonnaded galleries instead of inside corridors to go from room to room, and large comfortable laboratories with every modern appliance. There were first class microscopes provided for the students' use. It is needless to go into further detail as everything seen was satisfactory with the single exception of the medical library. This was no larger than many of the private libraries of some of my colleagues in the University of Pennsylvania, and contained few of the German, French, English and American journals without which it seems impossible to do research work. There was no *Quarterly Cumulative Index Medicus* or *Index-Catalogue of the Surgeon-General's Library*. Almost all of the books were in Spanish and Portuguese, and the journals mostly of Mexican and South American origin. There were few familiar books by much quoted authors.

One very satisfactory thing was that the students numbered only 60. I am somewhat in doubt whether our guide, who spoke English very indifferently, meant to say 60 students in a class, or 60 students altogether, but either way would be satisfactory. Large and excellent hospitals in which clinical instruction is given are adjacent.

MEXICO CITY

We left Guatemala City March 9th, 1944, at 9.30, having been delayed by fog, and flew to Mexico City, which we reached at about 12 M., and there found accommodations at the new Hotel Lincoln, near the intersection of Calle de Ravillagigedo and Aveneda Juarez, only a block or two from the beautiful little park called La Alameda.

Mexico City has a population of more than two million people, spread out over a great area and is full of things and places of interest. To try to see it in four days, as we did, is as impossible as it used to be to get a good dinner at the railway station restaurants in our own country years ago, when the trains stopped "twenty minutes for refreshments," and everybody got out and rushed to the buffet at the same moment.

We did not remain long enough in Mexico City for my circulation to accommodate itself to its altitude of 7400 feet, so that I was constantly annoyed by slight dyspnea and palpitation of the heart. The result was fatigue upon slight exertion, a disposition to do as little as possible, and a lack of enthusiasm about many of the things we were able to see.

We arrived at noon, secured our hotel accommodations, and after having eaten dinner in a very crowded restaurant, went out to walk about the old parts of the city—i.e., the neighborhood of the Zocalo or square in which the great Cathedral is situated, and about or adjacent to which are the National Palace, the City Hall, the National Pawnshop, the National Museum, the National University, etc.

The next day we succeeded in getting into the Cathedral, which was closed because new foundations are being placed beneath the great masonry piers holding up the dome, that was slowly settling into the soft soil beneath. Although seen in a dim light, and in spite of the dust and disorder, the interior of the great building was impressive because of its size, and because of the six or eight great chapels whose altar decorations, reaching from the floor twenty or thirty feet against the wall, elaborately carved and ornamented, are covered with heavy gold leaf that blazed even in the feeble light. After lunch we hired a motor car and had ourselves driven to Chapultepec Castle, saw the Park with its botanical and zoological gardens, visited the Lomas or Heights, saw the great new Army Hospital, and on returning to the city, visited the markets, a glass factory, the University and the Medical School.

The next day we did "window shopping" in the business part of town, made some purchases, and, having secured "box lunches," took a motor car for Teotihuacan, twenty-eight miles away, stopping to see the great church of Santa Maria del Guadalupe on the way. We ate lunch in a garden

across the street from a palace of the viceroys, now nearly in ruins, with a fine statue of the patriot, Morelos, in front.

It is at Teotihuacan that the largest and best-known of the Aztec ruins are situated. It is difficult to suppress the desire to describe these ruins and the emotions aroused by seeing them, but they must be passed with simple mention, like the Castle of Chapultepec, the Cathedral, and many other things.

The most imposing of the Aztec buildings thus far uncovered is the great pyramid of the Sun whose base is greater in size than any of the pyramids of Egypt, though it is only about half as high. Dr. Woodbridge was enthusiastic enough to climb to its top, from which an extended view of the whole neighborhood of the ancient Aztec city spread out, and ordinarily I should have gladly joined her, but with my heart pounding and my breathing labored, I took no interest in such exercise and was content to sit in the car and watch her wave to me from the apex.

I did get out to walk about the citadel and examine the ornamented pyramid it contains, but that could be done on the level, and I was much amused to find that my physical condition made me greatly magnify what I saw and did. For example, I judged the length of the citadel to be about a mile, and told various friends that it was that large, but upon looking up the actual measurements, find it to be only a quarter of a mile long!

The next day, Sunday, we spent partly in the National Museum, where is displayed the greatest of all collections of Aztec workmanship, including the great calendar stone.

We were greatly interested in the venerable relics, but we were also equally interested in those who came to look at them. It was Sunday morning and the number of visitors increased as the time passed, until the place became almost uncomfortably crowded. All of the people were, however, quiet and orderly, and much of the crowd was made up of family parties of Indians. A father would have a child of four or five by one hand, and another of six or seven by the other hand and be followed by a couple of lads ten or twelve years of age, while the mother carried an infant and perhaps had another small toddler by one hand. What they went to the Museum for is difficult to fathom, unless they went not knowing what was to be seen, for their education was certainly not such as to permit the adult to profit much, and the children could scarcely have understood anything.

The Medical School of the National University is something not to be forgotten. It is housed in the old "Palace of Justice, a grim building of the Holy Inquisition, dating from 1736, and still containing the old tribunal and cells." It is half a block in size, square, with court-yards about which are arched cloisters. It shows indubitable signs of its age, for the stone steps of its numerous stair cases are deeply dished by the feet of those who have gone up and down during the two centuries. Not built for the purpose for which it is now used, its rooms have been extemporized into classrooms and laboratories inadequate to present needs. The number of medical students is said to be 5000, and includes men and women, white, black and brown. This mass of young people throng the building, which is noisy beyond belief. On account of the great numbers to be accommodated, the laboratories seem to be run on one-hour periods. Lectures are largely given at night by professors who, we were told, practice medicine and surgery during the day in their private hospitals. The clinical instruction is given in a large, fairly new hospital, not far away, that we had not time enough to visit.

If some members of the faculty could have been found to explain and interpret what we saw, our impressions might be more favorable, but all of them being away, and our knowledge being derived from conversations with a few English speaking students, we left with feelings of great disappointment. We did not, however, fail to visit the library, in which, while most of the books were in stacks in an adjacent room, those books and journals in most constant demand were exposed upon open shelves in the reading room. Again there was absence of familiar books and journals and none of the great indices.

MEXICO CITY TO YUCATAN; MERIDA AND CHITCHIN-ITZA

On Monday morning March 13th, we left Mexico City at 8.40 A.M. to fly to Merida, Yucatan, which we hoped to reach about 1 P.M.

During my school-boy days I learned to spell those peculiar names of the Mexican volcanoes, Popocatepetl and Ixtaccihuatl, though the spelling used at that time was slightly different, and the pronunciation extremely different from that in present use. I also knew that there was a third volcano seen in all its splendor from the Gulf of Mexico as Vera Cruz is approached. I pictured these great conical peaks with their upper thirds

covered with snow, and columns of smoke spouting from their craters. One of my reasons for choosing the route we took was my hope to see and enjoy these awe-inspiring peaks.

Alas, this hope was not realized, because, when we reached Mexico City on the way down, all of the mountains were covered with clouds, to my great disappointment. On the way back, however, as we approached Mexico City, a great dark cone appeared on the horizon, its summit only in the clouds. It, we were told, was Orizaba, and again I was disappointed, for the clouds obscured the snow and the smoke. No sooner did we step out of the plane in Mexico City than I looked for the others, but could not find them. They too had summits in the clouds. Indeed, though we became familiar with their bases and their shoulders, at no time of our stay did the clouds clear away from the summits, and we flew away towards Yucatan with my great desire to see them at their best unsatisfied. I suppose that we were an hour away from the city, now and then gazing at the now familiar outlines of the mountains, but really seeing very little of them, when suddenly and unexpectedly the clouds opened, and through a perfectly clear atmosphere, we saw the full heights of Popocatapetl, Ixtaccihuatl, with Orizaba beyond. Beautiful sight! Orizaba 18,000, Popocatepetl 17,883, Ixtaccihuatl 17,338 feet high. All had their summits covered with glistening white snow, though the steep sides of the pointed cones let most of the snow slide off as it does from the Matterhorn in Switzerland. All three of the volcanoes are inactive at present, and there were no columns of smoke and steam.

As our visit to Yucatan was without medical interest, and was undertaken for the sole purpose of going to Chitchin-Itza to see the Mayan ruins, I feel that I should omit mention of it altogether. Without it, however, the chronicle of our adventures would be incomplete, so that I shall do no more than say that we found Merida a pleasant place with a charming hotel, and that from there we went by motor car some 85 miles to Chitchin-Itza where the ruins were. I regret the limitations of time and space more and more as I recall the Yucatan trip and its various adventures, for I feel that even though this is supposed to rehearse the high spots in a scientific medical trip, the reader might enjoy a thrill if I could tell him how we "Passed through Purgatory into Paradise," and how after perils of most unusual kind we found ourselves most unexpectedly "in the Lair of the Tiger!"

HAVANA

We left Merida after two days in Yucatan, at about 1 P.M. on Wednesday, March 15, and flew over the Strait of Yucatan to the beautiful green island of Cuba, reaching Havana at 5 P.M., where we were taken to the Park View Hotel. We remained in Havana for four days, during which time my former class-mate and friend Dr. Richard Wilson placed himself at our disposal as guide to the city and its environs, arranging a motor trip of the city ending with a visit to Miramar on the Gulf of Mexico, where we had lunch, an afternoon tea at the delightful home of one of his nieces, an expedition to the Leper Hospital, and various other things that gave us great pleasure.

I had visited Havana in 1904, when it was still recovering from the effects of the Spanish American war, and when it had but recently become safe for tourists through the successful campaign waged against yellow fever and malaria instituted by the United States Army and carried out by the Cubans under Dr. Juan Guiteras.

It was at that time a Spanish city with narrow crowded streets, large churches, a few hotels, and the usual Spanish type of dewlling houses built about patios. The "Prado" was the only wide avenue, and the "Malecon" of little importance. Obispo Street, very narrow, with very narrow sidewalks was the principal street of shops. At that time it would not have occurred to me to describe the city as beautiful.

Now things are not only greatly changed, but unspeakably improved. It is true that one sees but little change in the old crowded Spanish town except that in these days of motor cars the streets are vastly cleaner than in the days of horses. The Cathedral now seems to be both old and neglected, and the plaza in front of it, surrounded by the palaces of the Spanish hidalgoes, the Marquis of this and the Marquis of that, has become somewhat squalid. It is true that the city owns all of these old palaces, and is supposed to be conserving them because of their historic interest, but their mode of doing it seems to be very peculiar when we learn that one palace is now the headquarters of the "rum club," another a laundry, and a third a flat house, etc. The Cathedral was closed, but by walking around to the back, through the monastery grounds, we found a sacristan who unlocked

a door and permitted us to go alone into the church and ramble about at will. After the far more elaborate churches of Central America and Mexico it seemed austere and barren.

The great improvement has been in the opening of a new section of the city along the shores of the Gulf of Mexico by extending the Malecon several miles as a fine broad avenue, Avenida del Golfo, with more and more beautiful residences and apartment houses the farther one goes, on the inside, and open sea on the other. There must be at least two miles of this, terminating upon an elevated point upon which rises the large and beautiful Hotel Nationale. The Malecon Drive begins at a small fortress called La Fuerza and runs along the shore of the harbor, which is built up with masonry to afford support for the esplanade, to La Punta fortress, on the same side, about half a mile away, then it turns to the left at the harbor entrance and becomes the Avenida del Golfo.

Across the narrow harbor from the city, upon the top of a hill, is a large fortress—La Cabana. The entrance to the harbor is guarded on the city side by La Punta and on the opposite side by El Morro Castle, where the lighthouse is.

If my recollection serves me correctly, the U. S. battleship Maine was sunk in the harbor not far from La Fuerza. Its wreck was there when I visited Havana in 1904, but has now long since been removed.

Running off from the Avenida del Golfo are many streets, blocks long, all built up with handsome villas surrounded by beautiful gardens. All of these houses (with a few exceptions) are of the typical Spanish-American type, yellow or orange stucco, two or three stories high, with round arched windows and doors. Beautiful "rejos" or ornamental gratings protect the windows.

The gardens vie with one another in the number, variety and beauty of the bougainvillas, sometimes cultivated as vines over pergolas, sometimes up trees, sometimes themselves trimmed into trees —as we sometimes cultivate our Wistaria vines,— sometimes into hedges, the hibiscus, the oleanders, the palms, the cacti and many other tropical plants of which the northern traveller does not know the names.

But again I am letting my pen run away with me. Havana is a fine city and among the new and fine things that we saw in it was its University. It is situated in the new beautiful section of the city of which we spoke enthusiastically a short time back. It consists of a well-balanced group of large white buildings to the central one of which a great stairway ascends, between lesser buildings, to a Greek porticoed main building. There are numerous satelite buildings of conforming colonaded architecture and usually two stories in height, one of which houses the medical school, another the dental school. To some of the personnel of the medical school we were introduced by Doctor Wilson, and we were shown through the buildings and told of their methods. Like the new building at Guatemala University, this edifice is perfectly adapted to its uses and is equipped with every facility for educating the students. It is true that the department of anatomy might be criticized for having old-fashioned flat top dry tables instead of the "tank tables" now so generally in vogue, but that may be the personal preference of the professor. The room was very large with many tables all kept in good order, though it is rather smelly.

The microscope laboratories were equipped with excellent Leitz microscopes, and every table had a mercury vapor lamp so arranged as to illuminate the microscope and the table top without being seen by the student. There was a fine up-to-date laboratory of chemistry, and the nucleus of a good museum. The library we did not see. There are several new hospitals within a few blocks of the school, where the clinical instruction is given.

We were again surprised when told that this school has 3000 medical students. I was sorry not to have the opportunity to learn the method of handling such large classes.

Havana seemed to be a city where something between our group system of practice and health insurance is in vogue, and there are many hospitals —surgical, obstetrical, gynecological, laryngological, etc., scattered about the city, to which members of these societies or companies must go to be treated for their various ailments, having no choice of doctors, but compelled to be treated by whoever is in charge at the time.

Another institution of great interest to us was the National Leprosarium, some ten miles from the city. It consists of several acres of land well landscaped with trees and bushes, many of which were flowering, in which were wards disposed as separate buildings, a chapel, a "movie theatre," and other necessary edifices. All were in excellent order, perfectly clean, and the approximately 600 patients were clean, well fed, and for the most part contented. The nursing, as in Costa Rica, was in the hands of the Hermanas de Santa Ana.

MIAMI TO PHILADELPHIA

With many regrets we took the plane from Havana at about 2 p.M. on Sunday March 19th, flew over the straits of Florida and landed at Miami, Florida at about 5 P.M. Here our troubles began, for we had been unable to obtain any priorities for the flight from Miami to Washington, the last leg of our trip. Having passed the customs inspection, I hurried to the office of the Eastern Airways, to see what arrangements I could make, only to be told that every seat on every plane was reserved, and that I could secure no accommodation or even make a reservation until April 16th. As Doctor Woodbridge's leave of absence from the University of Pennsylvania would expire March 20th this was serious indeed, and the prospect of spending several weeks in a city crowded with soldiers and sailors, with accommodations extremely difficult to find and very expensive when found, and where there was nothing in particular to do or to see, was dismal indeed. The Eastern Airways found accommodations for us at the Alhambra Hotel, but before going there, I tried their office once more, begging them to inquire of the railroad whether under the peculiar condition in which we found ourselves, they could not accommodate us. At first the very pleasant gentleman who waited upon me—and here let me say that I have travelled a good deal in many countries during my long life, but never have I found such uniformly kindly, helpful and painstaking consideration as at the offices and ports of the Eastern Airways Company,—declared that it would be of no use, as he had already tried several times for others that day without success. But at last he was prevailed upon to try again, and seating himself at a table, he took up the telephone. After about five minutes of earnest conversation in which the expression of his face seemed to grow gloomier and gloomier, I saw it suddenly brighten and in another moment he came smiling to me saying, "I got them, I got them; while they were telling me that it would be impossible, two army men came in saying that they were required to stay a few days longer in Miami, and gave up two reservations that were immediately turned over to you."

So we spent one night in Miami, and left by rail at 7.30 A.M. March 20th, 1944 in the "Champion" in two reclining chairs that were side by side. It was not so pleasant to sit up all night, but it was only for one night, and we reached Philadelphia at 11.35 A.M., and Upsal, our home station, at noon.

The ride from Miami to Philadelphia had a peculiar interest that had to do with a seeming reversal of the seasons. I suppose most of us have seen motion pictures of the opening of buds into flowers, and perhaps some have seen the film reversed so that the open flowers shrank into buds again. We are all familiar with the budding and leafing of the trees and the coming of the blossoms in the spring, and we are equally familiar with the falling of the leaves in the autumn. But in this ride of a day and a half, we passed from semi-tropical Miami, where everything was in full bloom, to Baltimore, where the ground was covered with snow and the trees sheathed in the ice of a recent sleet storm, and in the passage seemed to see the leaves grow smaller, the blossoms return to buds, and the buds sink out of sight into the boughs and branches.

As I have recounted these adventures to some interested friends I have been asked, "Weren't you afraid to fly?" No, there was no time at which either of us experienced the least fear. Other emotions, such as expectation, interest, curiosity, and satisfaction, completely dispelled fear.

Visitors to the Mütter Museum

By ELLA N. WADE
Curator of the Mütter Museum and College Collections

IT IS surprising how many visitors find their way into the Mütter Museum in the course of a year, when one considers how comparatively few know of its existence.

Frequenters of museums are sometimes thought to be of a species, unique, by those who never visit them, but on the whole they are perfectly normal, intelligent individuals, whose reasons for coming are diverse, and the exceptions occur no more frequently than in any place open to the public. Some are actuated by an unexplained enthusiasm for any museum, be it medical or otherwise; others, being in the medical profession, have a genuine interest in its pathological material. Many come to obtain information and a few drift in to see some special exhibit. Those already acquainted with Mütter Museum—many of whose ancestors had a part in making it what it is, or who themselves have added to its treasures—bring strangers in so that they too may become familiar with the wealth of material in its cases. It is true that some are motivated purely by curiosity, and a minority drop in to pass the time while waiting for a friend who is using the library.

By this latter group I am always reminded of the story of the salesman, who, having removed all but one blanket from the shelves for a prospective customer's inspection, was told by the lady that she really didn't want a blanket at all, but was merely looking for a friend, whereupon the harrassed clerk replied, "Madam, if you think your friend might, perchance, be under that last blanket, I shall be glad to take that down also." Several Saturday afternoons I have been detained long past the closing hour of one o'clock, showing and explaining in detail most of our exhibits to a visitor, whose interest I could not seem to arouse. When finally, in desperation, I asked if there was something special he desired to see and he replied, "Oh no, I'm just waiting for a friend," I felt that the blanket salesman and I had much in common. But after one has greeted several hundreds of these visitors, one is usually able to tell to which class they belong, and know, without asking, whether they would like to be shown the specimens, or would prefer to wander around by themselves.

It is on College Night, when several hundred people attend the scientific lecture held in Mitchell Hall, that the Museum sees the greatest number of visitors at one time. On this day one looks the place over with a critical eye and the janitor is reminded that he must not miss corners. You make sure that the ink well is filled and the pen in readiness, in hopes that everyone who enters will heed the sign "Please Register," and do so. It never seemed to me to be much of a chore to sign my name, but it evidently is just that to many people. I often remind them politely to register before leaving, and while they invariably seem very willing, they will eventually leave without doing so. For this reason I have formed the undignified habit of "counting noses," and if visitors sometimes think it strange that I rush to the door, glance around the balcony, down the stairs and around the room, periodically, that is what I am doing.

A dinner usually precedes the meeting and it is while cocktails are being served, before Fellows and their guests enter the dining room, that a few will wander back into the Museum carrying their glasses. Some will not go much past the doorway. "This is the Museum," you will hear, and the guest from out of town will be given a brief glimpse of the Hyrtl collection of skulls and a few dim cases beyond, and by the time one reaches the doorway where they have been, they have already sauntered back to mingle with the rest. If, perchance, you do reach them in time to bid them a good evening, and offer personally to conduct them, they will invariably say, "Not tonight, thank you, we are just going in to dinner." It is indeed a pleasure when occasionally some kindly gentleman will say, "Please show me a few of your most outstanding exhibits now, and later I will come in and look around more thoroughly." When the visitor actually returns and sincerely enjoys the exhibits, he seems like an old friend.

A little before eight o'clock on College Night, the audience will begin to arrive by twos, threes or in small groups. Some go directly up to the lecture hall, but a great many come into the Museum.

The non-professionals who find pleasure in visiting us are relatives of doctors or nurses or men

who have always had the urge to study medicine, but for some reason have been unable to do so. Their interest is genuine and the knowledge they have gathered by individual study and reading enables them to view the contents of the Museum intelligently. As a rule the majority know something about the various lesions on display. They would not be attending a scientific lecture, which in many cases is far beyond the comprehension of the average layman, were this not true. But there are exceptions to every rule and so it is in this case.

Among the visitors on College Night are doctors and their families and young students with their lady guests. One knows from previous experience not to intrude when a confident young man arrives with his best girl. He will gallantly conduct her from case to case, carefully explaining in detail and if she happens to be a nurse or a student of medicine like himself, she will be as intrigued as her escort, but when one hears the lady say, "How fascinating," or "Isn't it perfectly marvelous," or some equally trite phrase (and you will always hear a few) one may be sure that she hasn't the faintest idea what he is talking about, only—she doesn't want him to know it. I hadn't been connected with the museum very long when I entertained this type of guest. She was young, blond and very pretty. She told me proudly, that she was a recent graduate of one of our universities and was extremely interested in anything and everything "medical." I was not overawed, exactly, but I began the tour of the Museum with some trepidation, for from her conversation I got the impression that she probably knew more about our specimens than I did. We were walking around the balcony looking at the bone injuries of World War No. 1—a collection assembled by the Pennsylvania Hospital Unit No. 10. In one case there is a specimen showing extensive destruction of the bones of the face, from multiple wounds. One missile had entered the mouth and passed through the palate and right eye. In a second wound the ascending ramus of the right jaw had been destroyed by a shrapnel ball that lodged in the neck, also causing, by leverage, the fracture of the left side of the mandible. There was also a third wound in the left frontal sinus and the bullet still lodged there. The right eye and part of the maxilla had been removed and after five days the patient had died from palatal hemorrhage caused by pulling the packing from his mouth in the night while delirious.

The girl stopped when she saw this specimen and as the label is self-explanatory, we read it together, after which my pretty visitor exclaimed, "How marvelously fascinating." To me there is nothing "fascinating" about a man having most of his face shot away and nothing "marvelous" about it unless you consider that he was kept alive in that condition for five interminable days. I formed the conclusion that the young lady was by no means intelligently impressed by our exhibits, and probably not even very much interested. I erred, however, for a short time later her "medical interest" came down from the library where he had been studying.

Some of our outstanding exhibits are listed on a card at the entrance to the Museum and a visitor not a physician will invariably ask to be shown the "Petrified Lady," the "Mütter Giant," and the "Siamese Twins." These, you might say, are our major attractions, although a student of medicine will find many other anomalies equally as interesting and probably more instructive.

Several years ago a student arrived with a craniometer and a half dozen note books and after securing permission, spent several weeks in the Museum measuring skulls in the Hyrtl collection. He declared that he had learned a lot from this special study, and I, not yet being very well acquainted with our specimens received a lot of valuable information from him during his stay here. We do not often have guests who stay more than an hour or two, however, although many return again and again and feel so much at home that they will obligingly snap on the lights and turn them off again if they notice that I am engaged in some work in the Museum.

One evening I was conducting a very charming lady and her party around. They seemed pleased to have me do this, although they were fairly well acquainted with the place. We came to the cases where the instruments are displayed and the lady, pointing eagerly to something in one of the cases, said to the young man in the party, "Oh, here is that odd surgical case Dr. X— presented."

Dr. X—— is a very kind and friendly gentleman and it pleased me to know someone took an interest in one of his donations, so I said, "Then you know Dr. X——?"

"I should," she replied, laughing, "I've been married to him for a great many years."

Visitors are welcome, not only because they break the monotony, but because they are usually helpful in one way or another. Often they will suggest the rearrangement of a wet specimen so

that the lesion illustrated may be shown to better advantage, and they frequently are able to identify some old and unusual instrument. One New York doctor spent quite some time looking at our stethoscope display and discovered that one instrument had been erroneously labelled. The true identity of this, which turned out to be a Pond's Sphygmograph, led to the exhibition of a fine collection of diagnostic instruments which had been stored away in their individual boxes for years with no one realizing just what they were or the extent of their historical interest.

We have one instrument, however, which no one so far has been able to identify. In fact, no one will even venture an opinion about it. It is quite large and bears the label "Presented by Dr. Harrison Allen." This is all we know about it. We removed it from the storeroom, cleaned it up a bit and it now reposes on the lower floor of the Museum waiting for someone to come along and tell us what it is. Pictures of it have been sent to Dr. Guy Hinsdale, a former Curator and many Fellows have examined it. The writings of Doctor Allen have been gone over thoroughly but no mention is made of anything of this description. It is not quite true to say that no one will venture an opinion, for a Fellow of the College brought the lecturer of the evening into the Museum one College Night, after the dinner and before going up to Mitchell Hall. The speaker was pleasant and friendly and I had the temerity to ask him if he would inspect this instrument and perhaps identify it. He graciously obliged, but after looking it over from all angles he finally said, "I think it must be some instrument used in a 'boogy-woogy' orchestra."*

Many times after donations are made the donor will come in to see how we have displayed his gift. We are not always able to give it the place he thinks it should have, as our space is limited. Many things could be shown to better advantage were space available. Our instruments have been entirely rearranged according to the part of the anatomy on which they are used, rather than grouping all kinds of forceps, specula etcetera, together as they were formerly classified. This was done partly because it seemed the logical way to arrange them since they are grouped in this way in instrument catalogues, and partly at the suggestion of visitors who wished to be helpful. Now, it is often hinted that they would show to better advantage in the original position, so you see a curator can't suit all of the people all of the time.

It is amusing to hear the same questions often repeated. We have in the Museum several pairs of antlers mounted and hung on the walls. The question is often asked why they are there. I must confess that I do not know. We have no record of the donor or the time of presentation. Seeing them every day they become inconspicuous, but to visitors I presume a medical museum seems a strange place for them. I am only glad that they are not attached to heads which I would be obliged to sprinkle with de-mothing powder as I do the fur Eskimo boots.

The question most frequently asked by persons who are not accustomed to see the type of exhibits found in the Mütter Museum, is how long it takes one to get used to spending every day with skeletons and other more or less gruesome objects.

Many persons reading the labels on the Hyrtl collection ask why Prof. Hyrtl collected skulls of criminals, principally, and since no explanation came with the accession, we can only presume that these individuals, because of their morals or violent deaths, were not claimed by relatives and were therefore available to anyone who desired them.

One question often asked and one that has also occurred to me, is since the body of the Petrified Lady is really hard soap, would scrapings taken from the body and put in water, make suds?

We solicit aid from so many sources that it is gratifying to be able to be helpful to others sometimes. During the summer a doctor from Ohio and his wife spent an afternoon in the Museum inspecting our cataloguing system. They have a museum of their own and were in the process of classifying the specimens in it. They thought that our method was a good one.

After cataloguing the specimens and cleaning the cases periodically, typing new labels and the like, one becomes familiar with most of the objects and it is a fairly simple matter to find a certain type of specimen when it is requested. It hardly seems possible that what I am about to relate could be true, but it is, and is one of the amusing things that has happened in the Museum. It was not due to stupidity on the part of the inquisitor, but rather to lack of sufficient information and the train of thought that existed in his mind. This young man came in one day and asked to see the specimen that showed the effects of severe cold upon the respiratory organs. I was sure that no such exhibit existed, but to satisfy him and myself I looked through our card file. As I thought, we had

* An article on this instrument is being written by Dr. Joseph McFarland, Honorary Curator of the Museum, and will appear in a subsequent issue.

nothing like that. I told him so and he was equally as insistent that we did, whereupon I asked his source of information. He told me that some years ago a friend had visited the College and told him of some of the exhibits in the Museum, and he vaguely recalled that one of them was the chest of some Arctic explorer, and why would we preserve this particular part of his anatomy unless it was for some such study.

At once I knew the chest to which he referred was not anatomical, but a surgical chest designed and equipped by Dr. Elisha Kent Kane when he became the surgeon of the Grinell Expeditions in search of Sir John Franklin and his party who were lost in the Arctic.

We have had some unusual visitors at various times. A man from a western state came in about 4 o'clock one afternoon, and in a tour of the Museum, having reached the case where the embryology of the chicken is displayed, he began a discourse on the sins of eating meat (eggs included), and so enthusiastic was he on the subject that he was not quite finished at 6 o'clock when I closed the Museum and he walked out to Market Street with me still talking and chewing lettuce leaves which he carried in his pocket and which he declared was the only dinner he ate at night. Thinking of him in the days immediately following, I wondered if I might have cannabalistic tendencies since I continued to enjoy a breakfast of bacon and eggs.

Then there was the little man who came to repair something in the building. He was intrigued by the apparent similarity of skeletons and their lack of personality, and when he got over being rather sad about it, it dawned on him that it also had its advantages, for he said, "Just think, in years to come they can put my skeleton in a case with those of Roosevelt and Churchill and no one can tell the difference. I'll be just as good as they are!"

One of the most unusual and enjoyable visitors to enter our portals was a little old lady, who in her girlhood had been a snake-charmer in a Wild West Circus. The world had not treated her kindly, but a sweet and sunny disposition still survived. Her name was Jennie, and she was well past sixty. Her clothing was shabby but neat and her rather disreputable hat was perched on her head at a jaunty angle. Her first visit was on a bitter cold day in February and she had lost one of her gloves. Her one hand was so cold that she had difficulty extricating it from the front of her thread-bare coat where she had tried to keep it warm. She must have been somewhat awed by the College, for she began by apologizing for coming in. I assured her that visitors were welcome and offered to show her around, but she said she had come expressly to see the Mütter Giant. I showed her the skeleton and she said, "Oh, no, that is not Pickett." Then she told me this story. A friend of hers, a Mrs. Nelson, of Indian Neck, Virginia, had seen an article about our giant skeleton in a southern paper and suspected that it might be that of an uncle, a Colonel Pickett Nelson who exhibited as a giant in Pony Bill's Wild West Show about 1890, where Jennie also performed as a snake-charmer. He had been taken ill and died while on tour and his body had been sent home where it was duly buried, but years later it was learned that the grave had subsequently been robbed and the skeleton turned over to persons unknown. Mrs. Nelson had written to Jennie asking her to come to see our giant since she (Jennie) lived in Philadelphia and not very far from the College. But my visitor stated that the Mütter Giant could not possibly be that of Nelson because of the spinal curvature which Nelson did not have. She brought us photographs of Colonel Pickett Nelson taken in the elaborate uniform he wore while in the show. She told us that he was part negro, but we learned from Dr. Charles Humberd of Barnard, Missouri, who sent us a great deal of information about him, that he was a Rappahannock Indian.

I was surprised at the interest the lady displayed in all of our specimens and her familiarity with names of doctors of that period and well known anecdotes about them. This was explained when she told me that she had posed for anatomical drawings and photographs for many of these famous doctors and professors, whom she had grown to know very well.

Jennie came back several times at our invitation to answer questions that arose, but our last request remained unanswered and we learned on sending a messenger to her home, that she had died suddenly on an April day in 1941, while on her way home from an art class where she was posing as a peasant.

Visitors come and visitors go, and often if they return a second time it is difficult to recall whether they have been here previously. Distinguished guests often are here so briefly that they remain only a name in my memory, but I shall always remember Jennie, a charming visitor, who at the age of sixty-nine, although in straitened circumstances, lived fully in the enjoyment of pleasant memories of an interesting past, while waiting patiently and hopefully for a brighter future.

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The Hypertension Problem*

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IT IS customary in any discussion of hypertension to review the historical theories, the physiologic possibilities, the pathologic facts, and the clinical probabilities. As the title of this lecture suggests, these phases of the subject will be passed over, to be mentioned only whenever they bear directly on those problems in which theory and evidence struggle with each other in more limited territory.

One fundamental definition merits repetition nevertheless. It cannot be emphasized too often that hypertension, as it occurs in man, is not a disease entity, nor even a uniform syndrome with constant symptomatology and course. On the contrary, elevation of arterial blood pressure is merely a clinical sign which can occur in a large number of diseases and may be produced by one or more of several mechanisms. Thus, when hypertension is found, the clinician is faced immediately with the important problem of deciding whether the elevated arterial pressure is (a) merely a secondary result of another and underlying disease, (b) a consequence of a definite antecedent renal lesion, or (c) by exclusion of the other two possibilities, really a hypertension of unknown etiology which can properly be called an essential hypertension. It is this numerically more frequent, and therapeutically most resistant, type of hypertension that has excited most experimental interest and will be the chief subject of this resumé.

It is generally granted that increased arteriolar tone and heightened peripheral resistance are the most important factors while blood volume, cardiac output, and blood viscosity remain, generally speaking, within normal limits unless some obvious complicating factors enter in. There is still no agreement upon the type of arteriolar abnormality which accompanies the very earliest stages of hypertension in man. It is interesting to note how an observer's concept of pathogenesis is apt to be colored by the circumstances under which he deals with hypertension.

It might conceivably begin with a functional, i.e. a purely neurogenic or vasomotor disturbance of morphologically normal arterioles throughout the body, or at least throughout a considerable part of the body. This concept was advanced first by physiologists immediately after discovering the vasomotor control of blood pressure, and particularly the effect on blood pressure produced by stimulating those sympathetic nerves which terminate in the splanchnic vascular tree. At present this concept appeals to many surgeons who have observed that suitable sympathectomy reduces arterial blood pressure, or failing that, at least relieves symptoms.

Again, either as a result of the disturbance just mentioned, or as an independent process, advancing organic lesions of the arterioles sooner or later become a prominent clinical feature. The clinician who follows his hypertensive patients year after year notices that some patients can

* Mary Scott Newbold Lecture LIV, The College of Physicians of Philadelphia, April 5, 1944.

support a high blood pressure for two or three decades in relative comfort, and without developing serious organic vascular disease or disabling symptoms. He also sees other patients, sometimes grouped in families, who under similar strain progress rapidly to advanced organic vascular disease, retinal angiosclerosis, cardiac decompensation, and renal failure. The clinician who observes these extremes repeatedly cannot help considering the possible importance of a constitutional weakness of the vascular system, based possibly upon hereditary susceptibility to vascular disease or upon environmental factors as yet unknown. Aware of the number of conditions which affect the syndrome of hypertension he will, for good reason, resist oversimplification either of diagnosis or of therapy.

Finally, since hypertension so frequently accompanies gross renal disease, there is the very prominent, and at present favored, possibility that a primary disturbance in the kidney is really the initial stage of the syndrome which then merges into first functional, and finally organic, disease of the systemic arterioles. It is at the postmortem table that practically every case of hypertension presents also definite evidence of renal vascular disease. Hence, in general, pathologists have usually championed the etiologic importance of renal disease, even in those instances in which renal insufficiency could not be detected by the relatively crude clinical tests of kidney function used during life.

You may notice that all of these possibilities are described in terms of pathogenesis and not in terms of fundamental etiology. Even if human essential hypertension were proved conclusively to be consistently due to one or more of the disturbances mentioned, there would still remain the basic question of what produced the initial change in general vasomotor tone, or the initial change in arteriolar structure, or the initial change in renal blood flow, and thereby started the vicious cycle.

Cause and effect are much clearer, however, in the renal form of experimental hypertension. In fact, a few well established premises or even axioms can be stated. It can surely be accepted, as proved by Goldblatt (1) ten years ago and many others since then, that mechanical interference with the flow of arterial blood to otherwise normal kidneys has produced in several species of laboratory animals an experimental hypertension which simulates with remarkable faithfulness the pathologic physiology and, except in the ischemic kidney itself, the pathologic histology of human essential hypertension. Even the benign and malignant phases of this disease have been imitated in animals with the exception of certain natural and apparently inescapable limitations.

Second, of equal importance is the sharp distinction that must be made between a simple, uncomplicated interference with the arterial blood supply of a kidney and the advanced histologic changes found so generally in postmortem material by the pathologists. At one extreme the histologic appearance of a kidney with uncomplicated ischemia may be practically normal; yet it is associated with systemic hypertension. At the other extreme are the cases in which gross destruction of the kidneys produces total renal failure and uremia, but is still associated with a normal blood pressure. Between these two extremes we find a complete spectrum of various combinations of mild to marked hypertension with slight to severe, and microscopic to gross, structural change.

This distinction between the effects of gross structural changes in renal tissue, and the effects of more subtle, possibly metabolic, changes has clarified one clinical enigma without, however, explaining it completely. Advanced polycystic kidney disease, hydronephrosis and pyelonephritis produce characteristic distortions of renal architecture in all cases but only about half of these cases become seriously hypertensive. Conversely, in this same group of diseases when the symptoms and signs of the local lesions happen to be inconspicuous, the clinical picture may easily be mistaken for that of essential hypertension. It is in this group that omission of complete urologic studies may lead to an erroneous diagnosis of essential hypertension, with consequent neglect of some easily curable renal lesion. This dissociation indicates clearly that it is in the very earliest, rather than the latest, stages of the hypertension syndrome that etiology should be searched for in man.

Third, experimental hypertension of animals is certainly humoral in the sense that some return of venous blood from the affected kidney to the general circulation is required. Total ligation or removal of the single affected kidney has relieved the hypertension of laboratory animals and of a few human beings. Houssay and Fasciolo (2) joined a kidney with a clamped renal artery to the carotid artery and the jugular vein in the neck and

recorded a conspicuous increase in the blood pressure of a nephrectomized recipient animal, whereas similar transplantation of a kidney with normal arteries did not raise the blood pressure of the recipient. All the *afferent* nerve pathways leading from the kidneys to the central nervous system have been exonerated by the transplantation just described, and by finding that total denervation of the kidneys in situ neither cured nor prevented experimental hypertension.

Similarly Freeman and Page (3) found that after both sympathetic chains were removed, hypertension persisted. Thus, on the *efferent* side, the sympathetic pathways, which include the known vasoconstrictor fibers, are apparently not necessary. Glenn and Lasher (4) destroyed the spinal cord at the level of the fifth cervical vertebra and found that hypertension could be induced nevertheless. Therefore they concluded that neither the spinal cord nor the medullary centers are essential for renal hypertension.

Since we are dealing particularly with problems, more time must be given to results which have been interpreted differently. For instance Dock (5, 6) has objected to this general exoneration of the nervous system. Using normal and hypertensive rats, rabbits, and dogs he pithed the spinal cord and found that in both groups arterial blood pressure, after a very brief rise, promptly fell to the same very low level. From this he concludes that a peripherally acting vasoconstrictor substance cannot be responsible for hypertension, because pithing should not interfere with the action of such a substance and should therefore not reduce the blood pressure of the hypertensive animal, or at least not to the extent observed in previously normal animals. Actually, blood pressure fell equally in the two groups. Moreover, epinephrine which is the ideal prototype of a humoral and peripherally acting vasoconstrictor agent, promptly raised the blood pressure of the pithed animals, whether normal or hypertensive.

Dock suggests therefore that experimental hypertension results from a modified "set" of the vasomotor center and cites for comparison the familiar example of fever in which a bacterial protein enters the blood stream and raises by several degrees the level of body temperature, and of thermoregulation, at which heat production and heat loss are kept once more in balance. The evidence for this postulated abnormality of the vasomotor center and the establishment of a new level of blood pressure in experimental hypertension is far from complete, as Dock himself mentions. For instance, it required only one-third to one-fifth as much epinephrine to produce a given rise of blood pressure in the pithed, hypertensive rabbit as was necessary in the pithed, normal rabbit. This bespeaks a peripheral difference of vascular response if not of tone.

The gross trauma of pithing not only interrupts suddenly and forcibly all vasoconstrictor and vasodilator pathways but also introduces irritative effects which might well lead to discharge of stimuli along both pathways in widely different and at present unknown intensity. This possibility applies particularly to acute experiments having a duration of only a few minutes. We know very little about the function of the dilator fibers in hypertension, though the absence of any known tonic action in the normal animal makes their participation in hypertension unlikely except under extraordinary conditions such as those which obtained in Dock's experiments. The important point of these experiments is that manipulation of the nervous system can modify experimental hypertension acutely in animals, and that while epinephrine acts with its usual vigor during this manipulation, the injection of renin raises blood pressure less effectively than usual. This suggests, as will be developed later, that hypertension is produced by a much weaker, and more easily abolished, constriction than that produced by epinephrine. External factors which leave an epinephrine constriction untouched, may affect that constriction which results either secondarily from renal ischemia or more directly from the injection of renin.

All the evidence which tends to exclude the participation of the nervous system favors the humoral hypothesis, but only in a negative fashion by denying the role of neurogenic components. The positive evidence of a humoral mechanism at present depends to considerable degree upon the properties, identification, and fate of renin, a substance which Tigerstedt and Bergman (7) identified in 1898 by observing the pressor action of crude kidney extracts. When they injected these extracts of kidney tissue into intact or decapitate animals they observed that blood pressure rose in a distinctively slow and persistent manner, quite different from the sudden rise and abrupt return to normal observed with epinephrine. From 1900 to 1915, with one or two exceptions, repeated attempts by others to verify the existence of this

unique substance in kidney extracts failed because special treatment is required to rid the crude kidney extract, pulp, or juice of depressor and lethal material.

Montgomery, Sparkman and Landis (8) described the importance of purifying these crude extracts, which in their original state were rapidly lethal or markedly depressor, and always conspicuously reduced the blood flow to the ear of the injected rabbit, as indicated by a fall in skin temperature. Simple heating of these crude extracts for twenty minutes to 50, or better 55, degrees Centigrade eliminated the toxic and depressor fractions. There was then revealed quite constantly the typical effect of renin in that the previously lethal extracts elevated blood pressure in the manner described by Tigerstedt and Bergman. In agreement with Tigerstedt and Bergman they found that heating purified extracts to 60 degrees or more promptly destroyed all pressor activity.

Studies of this type also revealed an important difference between the action of these partially purified kidney extracts and that of all other substances which have been from time to time held responsible for the hypertensive state. If the blood pressure of the unanesthetized rabbit is elevated only a few millimeters of Hg by the slow infusion of 1:250,000 epinephrine, cutaneous blood flow is sharply diminished as shown by the conspicuous reduction of skin temperature. This indicates the well known preferential constrictor effect which epinephrine exerts on the cutaneous vessels, including the arteriovenous anastomoses. It is the experimental counterpart of the cold extremities observed in patients who have received an overdose of epinephrine or who have a paroxysmal hypertension due to an adrenal pheochromocytoma. Even more constriction of cutaneous vessels appeared with injections of pituitrin, as well as with the commoner guanidine compounds and with ergot derivatives, all of which separately have been held at intervals to be important etiologic agents responsible for human hypertension.

The injection of a purified rabbit kidney extract, even when it elevated blood pressure to much higher levels than any of the preceding agents, did not reduce cutaneous blood flow and skin temperature remained constant. These results suggest that in contrast to other pressor substances the active material in kidney extracts increases the tone of all the arterioles throughout the body more or less equally. Since in each vascular bed peripheral resistance and arterial blood pressure rise proportionally, blood flow remains approximately normal.

Beginning in 1936 Prinzmetal and Wilson (9), Pickering (10), Grant and Holling (11), Wilkins and Eichna (12), Abramson and Fierst (13), and others have studied blood flow through the peripheral tissues of hypertensive human beings. Though studies on muscle are not in entire agreement, the skin temperature and heat loss of patients with essential hypertension are consistently normal under widely varying conditions. On the basis of these observations, Pickering has summed up the evidence by saying that the hand vessels are narrowed by a non-nervous agent and that this narrowing is of an order such that, if generally distributed throughout the body, it would account for the hypertension. This similarity between the hypertensive patient and the rabbits injected with a potent purified kidney extract is striking, and has been advanced as indirect evidence in favor of the importance of renin in the hypertension syndrome.

The purification of renin from such kidney extracts has been much improved in recent years by repeated precipitation with alcohol, ammonium sulfate, or graded acidity so that Schales (14) has produced purified material in which solid substance corresponding to between 4 and 5 micrograms of protein nitrogen raises the blood pressure of the rabbit or dog by 30 mm. of Hg. This brings the activity of renin, with respect to dose, into the same order of magnitude as that of epinephrine. Improved methods have also increased the yield of renin from normal kidneys. From hog's kidney, which is a particularly rich source, Schales has obtained very large total yields of renin but it is only in some species, and with expert extraction, that yields of this magnitude are obtainable. With successive steps of purification, losses are considerable.

Careful separation of depressor fractions is important since early assays of the renin content of normal and pathologic kidney tissue were complicated by confusion arising from mixtures of renin with depressor or toxic substances. From some of these early assays it was suggested at first by Harrison et al. (15) and by Prinzmetal et al. (16) that the kidneys of hypertensive animals or man contained more constrictor material than did normal kidneys.

There is no question that a form of renin is present in the human kidney because the injection of heated extracts of kidneys removed at autopsy elevates the blood pressure of the assay rabbit also without diminishing blood flow to the ear (17). The rise of pressure is characteristically slow and the effect persists for 30 to 45 minutes. That renin might be overabundant in the kidneys of animals with experimental hypertension or in human beings with essential hypertension is an attractive concept to be compared logically with what is known of the hyperadrenalinemia of pheochromocytoma, and hyperinsulinism from islet tumors of the pancreas. In both these conditions the affected endocrine glands are very rich in the active hormone. In essential hypertension, however, there is no tumor and from recent studies with carefully prepared extracts there is no uniformly increased local concentration of renin in the kidney tissue (17).

Kidneys were removed at autopsy from patients who had died from hypertension and from causes other than hypertension. These extracts were detoxified by the heating method as soon as possible after death and injected into heparinized, anesthetized rabbits. The extracts of normal kidneys were usually inactive with 15 mm. Hg the maximum rise obtained in sixteen assays. The extracts from kidneys of hypertensive patients were also inactive in twenty of thirty-six instances, and in only four cases did the rise of blood pressure exceed the normal range of variation. The average changes in blood pressure, 3.0 mm. Hg for normal kidney extracts and 7.0 mm. Hg for the hypertensive group, are not significant because of this great overlap.

When the results obtained in various types of hypertension were segregated it became evident that assays in nephritis and in benign nephrosclerosis were entirely within the normal range. Kidneys from patients with malignant nephrosclerosis produced a greater proportion of active extracts, with fewer inactive ones. All of the four exceptionally pressor extracts were in this group, but no valid correlation with the clinical state of individual patients was possible. Schales (14), using far better extraction methods, also reports similar lack of relation between renin content of kidney tissue and the blood pressure before death.

The disadvantage of such observations on man is that varying times necessarily elapse between the agonal period, actual death, and the assay. During this period autolysis might conceivably alter conditions within the kidney tissue. It is interesting therefore to find that in animals, where autolysis can be avoided, there exists a similar independence between the renin content of the kidneys and the blood pressure before death. Pickering et al., (18) found from 1 to 4 units of renin in the kidneys of normal rabbits. When animals were made rapidly hypertensive, but the kidneys were infarcted, less than 1 unit could be found. When infarction was avoided the renin content rose to levels slightly but definitely above normal in only three instances. But in chronic hypertension the range was once more well within normal limits. Thus, while the concentration of renin in kidney tissue may be raised in a few instances, this is only a transient phase because the amount of renin in kidney tissue removed from animals or human beings with established hypertension is, generally speaking, not raised above normal.

Proponents of the renin hypothesis are quick to mention that this of itself does not diminish the importance of renin because it is possible that renal cells which normally keep this substance safely isolated may, in ischemia, be damaged enough to allow its escape into the blood stream, thereby reducing the renin content of kidney tissue even though overproduction occurs simultaneously. It is therefore in the blood stream that the renin hypothesis must really meet its test.

All of the discussion on renin so far has involved its injection into the blood stream of test animals, its effect being measured by a rise of systemic blood pressure. Yet, when reasonably pure renin was injected into a tissue perfused with Ringer-Locke solution, Kohlstaedt, Page and Helmer in this country (19) and Braun-Menendez et al. (20) in Houssay's laboratory in Argentina, found that it did not produce constriction. When renin was mixed with whole blood or plasma and incubated for a few minutes in a test tube this mixture did produce constriction in the isolated tissue and also a far more prompt and evanescent rise of blood pressure in the intact animal. The details of Houssay's concept have stood the test of time rather better than those of Page so that the terminology of the Argentinian workers will be used.

Renin, a colloidal, heat-labile, alcohol-insoluble, enzyme-like substance apparently acts upon a

pseudoglobulin of blood called hypertensinogen to form hypertensin. This hypertensin is dialyzable, heat-stable, soluble in alcohol and resembles a proteose or peptone. The reaction can be elicited in semi-quantitative fashion by mixing renin and plasma or purified hypertensinogen in the test tube. After the remaining renin is precipitated by alcohol the newly formed hypertensin can be separated and then assayed quite accurately by injection into a test animal. This assay in the intact animal seems far more dependable than any method involving the perfusion of isolated tissues for reasons that will be mentioned shortly.

The kinetics of this reaction are reasonably predictable in vitro. In the intact animal, however, when an ischemic kidney is supplying the renin there are at least four or five known factors concerned with the completion of this reaction, or its arrest. First, a few minutes must elapse before hypertensin can be liberated since the reaction is apparently a relatively slow one. Thus Houssay's group (21) have found that renal vein blood in the hypertensive animal contains at first renin but no hypertensin. Several minutes' incubation of this renal vein blood in a test tube produces hypertensin. It is concluded that the slow rise and slow fall of blood pressure after the injection of renin into the intact animal merely reflects the time that must elapse before active hypertensin is formed. Pre-formed hypertensin, when injected into the intact animal produces a sharp rise of blood pressure and an abrupt fall with time relations not unlike those shown previously for the infusion of epinephrine.

Second, the complete reaction requires hypertensinogen, of which there is only a limited amount available in the circulating blood. When renin is injected repeatedly tachyphylaxis is observed; that is, successive doses elicit smaller and smaller responses, and finally no response at all owing, it is believed, to temporary depletion of circulating hypertensinogen. After a rest of several hours when the circulating hypertensinogen is available again the original response can be obtained. This diminishing effect by repeated injection, or by prolonged infusion, is one of the chief obstacles to the hypothesis that overproduction of renin is the sole cause of hypertension.

Third, the reaction which produces hypertensin is to some extent limited by species-specificity. Animal renin, notably that from hog kidney, does not react with human hypertensinogen so that even large intravenous doses of hog renin have no effect on human blood pressure (21). Human renin, on the contrary, reacts with most, if not all, animal hypertensinogens. Even when these reactions do take place, however, the final product is not equally effective in all species (22), as shown by injections of equivalent doses of homologous and heterologous renins into the rat, guinea pig, rabbit, and dog. The yield of renin per 100 grams of kidney tissue as measured by average pressor effect was greatest in the rabbit and least in man. Rabbit renin was generally effective in all four species, whereas rat, guinea pig, dog and human renin were more variable in their cross-species effects.

Fourth, hypertensin according to Houssay is destroyed rapidly in vitro by an enzyme-like material tentatively called hypertensinase found in the circulating blood plasma and quite abundantly in liver, spleen, and erythrocytes (21). Assays have been extended to the nephrectomized and the hypertensive dog by Dexter (23). Neither procedure affects circulating hypertensinase and the actual protective value of this substance in vivo during hypertension remains uncertain.

Fifth, it has been shown clearly by Goldblatt and others that normal kidney tissue has the power of intercepting or diminishing the pressor effects of the opposite ischemic kidney. This is not due, as was suggested at first, to production of hypertensinase by the normal kidney because, as just mentioned, neither nephrectomy nor renal ischemia affect the hypertensinase content of the circulating blood, nor is hypertension in man associated with a diminished amount of hypertensinase in the circulating blood.

Finally, Houssay, Braun-Menendez and Dexter (24) found that injected renin disappears from the blood of normal dogs in thirty minutes, and from the blood of nephrectomized dogs in one to three hours. They concluded that while normal kidney tissue has some destructive action, the general tissues are more important. Uremia slows the disappearance of renin chiefly because the destructive power of the tissue is altered, not because uremic blood lacks some substance which is derived from normal kidney tissue. How the tissues remove renin remains unexplained.

The renin-hypertensin system is therefore intrinsically complex with at least four or five mechanisms capable of arresting or destroying it. Under these circumstances great weight must be placed upon any demonstration that hypertensin,

as the active pressor agent, is present in the blood stream. Houssay, in a recent review (21), states that he and his co-workers have not been able to identify hypertensin in the systemic blood of the hypertensive dog, even though, as was mentioned, renin and small amounts of hypertensin can be found in blood from the renal vein of an ischemic kidney.

Page (25), on the other hand, reported that hypertensin could be detected provided assays were performed with the surviving rabbit's ear perfused with a mixture consisting of equal volumes of Ringer-Locke solution and defibrinated blood from a nephrectomized dog. The donor dog was nephrectomized in order to provide an abundance of activator, referred to here as hypertensinogen, and to eliminate hypothetical interfering agents that might arise from the normal kidney. According to Page, small injections of serum or heparinized plasma from a hypertensive dog or human being into the perfused ear were uniformly constrictor, whereas the serum or heparinized plasma from the normal subject was inert. Quantitative relation between this constrictor action and the severity of the hypertension was not described.

Since this appeared to be the final proof of the renin hypothesis it seemed essential to verify these results and if possible to make the method quantitative, because it would obviously be most helpful in diagnosis and therapy. Landis, Wood and Guerrant (26), using the rabbit's ear method as described by Page, found that serum was always highly constrictor without respect to its origin whether rabbit, dog, or man, normal or hypertensive. With heparinized plasma, constrictor activity was inconsistent and had no discernible relation to the blood pressure of the donor. In addition, even before any assay injections were made it was noticed that the entrance of defibrinated blood from the dog, or even from the rabbit, into the surviving rabbit's ear produced at once a marked vasoconstriction. In order to force small amounts of blood through the ear, unphysiologically high pressures had to be used and in a very short time even pressures of 145 mm. Hg systolic, and 100 mm. Hg diastolic, were unsuccessful.

Many investigators in the past 40 years have found that serum and defibrinated blood constricted vigorously the vessels of isolated perfused tissues. It was Janeway's interest in the question of pressor substances in the blood of hypertensive patients that led him to prepare in 1918 a very complete review (27) on the subject of vasoconstrictor substances in shed blood and to suggest that destruction of platelets is responsible for the appearance of these substances. It seemed likely that inability to repeat Page's results might be due to varying amounts of powerful vasoconstrictor material arising from products of coagulation in the defibrinated blood recommended for perfusion or in the serum and plasma used for assay.

In these experiments (26) the rabbit's ear was severed and placed at once in an incubator with a cannula in the auricular artery through which Ringer-Locke solution was perfused for a few minutes at a constant low pulsatile pressure, usually between 30 and 40 mm. Hg systolic and 20 to 30 mm. diastolic. The perfusing fluid flowing from the auricular veins was collected in a funnel and flow was recorded by the number of drops emerging per minute. A reduction in drop rate, pressure being always constant, represented constriction. After a few minutes defibrinated rabbit's or dog's blood was turned into the ear instead of the Ringer-Locke solution. This was followed by an immediate constriction which was visible to the naked eye and which reduced flow from between 20 to 40 drops per minute to zero in a very few minutes. It would have been possible to have increased flow temporarily by raising the perfusion pressure, but experience showed that despite this the constriction became increasingly severe and that no really stable preparation could be obtained in this way even with abnormally high pressures.

To test the possibility that arrest of the coagulation process at an early stage might reduce this constrictor artefact, heparinized rabbit's blood was then used. This delayed, but did not prevent, the tight constriction. Finally, to arrest the coagulation process at a still earlier stage the donor rabbit, which supplied the blood used for perfusion, was given a large intravenous dose of heparin 15 to 30 minutes before blood was withdrawn from the heart. Such "pre-heparinized" blood, coupled with painstaking removal from glassware and syringes of all chemical residues of previous perfusions, resulted finally in the maintenance of a constant perfusion rate at constant, low mean pressures. While it cannot be claimed that artificial constriction was entirely abolished, yet for periods of one to two hours, and frequently longer, a reasonably stable and physiological perfusion could be carried out.

In such preparations the results of injecting 0.2 cc. samples of blood showed the difficulties surrounding any direct assay of shed blood for pressor substances. A constrictor artefact can be produced by a slight change of temperature, as by opening the incubator door briefly, so that all injections for assay were necessarily made from outside. Control injections of Ringer-Locke solution and of heparin had no effect on the vessels but defibrinated blood and serum were highly constrictor. The addition of heparin after clotting had occurred did not reduce this constrictor activity. Only carefully heparinized and rapidly separated plasma was inert.

In general it appears that the longer the platelets remain in contact with the plasma, the more apt is that plasma to show false constrictor effects, particularly in the rabbit's ear, the vessels of which are constricted also by any histamine released as the platelets disintegrate. Hence, in direct assays of this sort it is necessary that the technique of withdrawing a blood sample be extremely good, to prevent contact between the blood sample and tissue fluid as the sample is taken. Equally important is the early separation of platelets by centrifugation, or preferably by Berkfeld filtration, within a few minutes. Except for platelets the other constituents of plasma concerned in coagulation do not liberate detectable amounts of constrictor substance. It has been demonstrated recently by Thomas (28) that serum produced by an excess of thrombin added to platelet-free heparinized plasma is not constrictor. Thus it is the disruption of platelets rather than the remainder of the coagulation process that produces these constrictor artefacts in assays involving the perfusion of surviving tissues such as the rabbit's ear. These artefacts are large. For the rabbit's ear and for a given volume of blood the constrictor activity appearing in the course of coagulation is several times greater than that which can be produced by adding an excess of renin to the same volume of blood.

With due regard for the precautions necessary in assays of this type samples of blood were removed from normal rabbits during infusions of epinephrine and rabbit kidney extract to test the direct effect of the circulating plasma on the vessels of the rabbit's ear. Epinephrine (1:100,000) was infused intravenously and blood was removed from the heart when the rise of blood pressure was well established. Later in the same animal heated rabbit kidney extract was infused to produce a second and greater rise of blood pressure and blood was again removed at the peak of the response.

The effects of control and experimental blood plasmas on the vessels of the perfused rabbit's ear were studied. Each blood sample was withdrawn into a syringe containing an excess of heparin. After gentle mixing the blood sample was immediately placed in plastic tubes, centrifuged at high speed, and the plasma decanted carefully to be centrifuged again and once more decanted, and then injected in 0.2 cc. doses into the perfusion fluid immediately before it entered the ear. Injections were made in triplicate. Normal rabbits and nephrectomized rabbits were used. In summarizing results of this type it has been both convenient and accurate to chart the rate of flow on a standard scale and measure the area in square inches of any deviations from the control flow (26). This takes into account both the intensity and the duration of a dilatation or constriction, a positive sign indicating dilation; a negative sign constriction.

Control plasmas produced no significant constriction, minus 0.05 sq. in. being the largest effect. Those plasmas which were removed during the temporary rise of blood pressure due to epinephrine produced constrictions amounting to between minus .33 and minus .63 sq. in. Control observations indicated that the rabbit's ear responded to 0.2 cc. of 1:10 million epinephrine by a constriction of minus 0.17 sq. in. to minus 0.31 sq. in. Despite the greater rise of blood pressure produced by the renin in the heated rabbit kidney extract, plasmas removed at the height of the response were uniformly inert when injected into the rabbit's ear.

These results need to be extended to other species and to other tissues before any conclusions are permissible, but three possible explanations may be considered. In the first place the cutaneous vessels of the rabbit's ear may not react to hypertensin but this has been excluded by the studies of Abell and Page (29) who used the transparent window and observed constriction of the auricular arterioles in the rabbit. In addition, we have observed that the vessels of the perfused ear constrict feebly but definitely after injection of mixtures of renin and blood, which have been incubated for 15 to 45 minutes in vitro.

Second, hypertensin might be destroyed rapidly

in the circulatory system by hypertensinase or other factors. This has not been excluded since according to Dexter (23), even bilateral nephrectomy does not reduce the hypertensinase content of blood plasma. Nevertheless it would seem remarkable that a large rise of blood pressure would be observed if destruction in the circulating blood were so rapid and complete. The third and most probable explanation is that hypertensin, as soon as it is formed, immediately leaves the freely circulating blood to be attached at once to the smooth muscle of the blood vessels, and in so doing produces its constrictor effect.

These results coincide with the experience of Houssay (21) but cannot be brought into agreement with the results of Page (25). If further work on other tissues and in other species establishes this immediate removal of hypertensin from the circulating blood in vivo it will explain the many negative results observed in man, and in animals when blood has been transferred from hypertensive donors to normal recipients without effect. It would explain also the failure of almost all observers to detect pressor activity when the blood from hypertensive animals and man or extractives of such blood have been injected in many different assay preparations. It also suggests that it may be very difficult to devise a really crucial test of the relevancy of the renin system to both experimental and human hypertension. It may even be necessary to depend upon an indirect approach such as a study of the reactions of vascular smooth muscle before and after exposure to hypertensin or allied pressor substances.

This approach has already received considerable attention, the remarkable feature being that despite hypertension so many of the responses and functions of the human circulatory system are still normal. It has already been mentioned that in early and uncomplicated essential hypertension and in experimental hypertension cardiac output, blood viscosity and blood volume are, generally speaking, within normal limits. The carotid sinus is still active in the hypertensive patient though its responses are set to maintain a higher mean pressure. Temperature regulation, which depends for its effectiveness on rapid swings from tight cutaneous vasoconstriction to wide dilatation, is also normal despite the higher basic vascular tone. This is evident in the ordinary temperature chart of the hypertensive patient and has been verified more quantitatively by Steele and Kirk (30) who found in the same environment no difference between the skin temperatures of normal and hypertensive individuals. Kapp, Friedland and Landis (31) have shown the same to be true for hypertensive rabbits. In the hypertensive, as in the normal rabbit, skin temperature of the ear is low in a cold environment, but rises rapidly as soon as the animal is heated enough to raise rectal temperature to 40.5 degrees C. or more. The relation of skin temperature to rectal temperature is the same, despite greatly increased basic arteriolar tone in the hypertensive animal.

When renin or rabbit kidney extract is injected into a hypertensive rabbit the absolute response is the same as, or slightly greater than, that observed in a normal rabbit, the only difference being that the temporary rise of blood pressure begins at a higher level and by simple addition, raises a higher peak. The response appears with the usual delay and persists for the usual time without modifying cutaneous blood flow. Taggart and Drury (32) justifiably emphasize that if experimental hypertension is due simply to overproduction of renin which, as mentioned above, produces tachyphylaxis in the intact animal, additional renin introduced from outside should produce less effect on blood pressure when injected into hypertensive animals than when injected into normal animals. Such lessened effect was observed by us in one animal with a very marked hypertension but not in others with moderate or slight hypertension (31).

In hypertensive human beings most of the vascular responses so far studied have proved normal. In this group are included the reactions of the cutaneous vessels to local heat and cold, the response of the arterioles in muscle to exercise, and the general constrictor effects of epinephrine, pituitrin and tyramine. Eichna and Bordley (33) have reported that capillary blood pressure is within normal limits, thus adding to the evidence that the increased peripheral resistance is situated in the pre-capillary or arteriolar zone. Hortenstine (34), using the pressure plethysmograph, has observed that fluid movement through the capillary wall during graded venous congestion was roughly normal in a small group of hypertensive patients.

The vascular system of hypertensive patients responds abnormally to a few stimuli, such as immersing the hand in cold water, inhalation of carbon dioxide or prolonged breath holding. Histamine occupies a position midway between these

two categories because, as shown by Griffith et al. (35), the local responses of cutaneous vessels differ in various types and stages of hypertension.

From the etiologic point of view, unquestionably the most significant abnormality of the hypertensive vascular system is a diminished renal blood flow. Smith and his co-workers (36) by means of inulin and diodrast clearances, have concluded that the efferent arterioles are constricted and, glomerular capillary pressure being thus raised, glomerular filtration is maintained at its usual level. This work has been presented to you in detail by Dr. Homer Smith himself and it is necessary to mention now only the fact that this interesting response explains the maintenance of normal excretory function by a kidney despite reduced blood flow. Renin and angiotonin, according to Corcoran and Page (37), duplicate this response in normal dogs. It must be emphasized, however, that this effect is not specifically limited to essential hypertension, or to the renin system, because epinephrine injected into a normal human being also reduces renal blood flow by constricting the efferent arterioles, thereby maintaining a constant rate of glomerular filtration. The important point is that of the various tissues studied so far in hypertension, kidney tissue is more likely than others to present an abnormally low flow and that renal blood flow diminishes prior to, rather than with, the destruction of the renal parenchyma.

The problems in pathogenesis which I have outlined have influenced therapy and raised new problems there which are still a matter of uncertainty and sometimes of argument. Producing experimental hypertension in animals by interfering with renal blood flow has called attention to the existence of a true "renal hypertension" in man. A few,—and really a very few,—cases do owe their elevated blood pressure to a disorder of one kidney. This may be a unilateral congenital anomaly, hydronephrosis or pyelonephritis. The results of unilateral nephrectomy, to judge from all the cases so far reported, are not universally good nor always permanent, particularly when one considers the likelihood that successes are more apt to be reported than failures.

The decision to remove a kidney in order to relieve hypertension is hedged about with reservations since age, duration of the hypertension, the state of the vessels, and existing kidney function all affect the final result. In urging complete urologic studies in all cases of early hypertension it is realized that the incidence of really clear-cut renal hypertension due to unilateral disease is small, probably only one to two per cent of all cases investigated. Nevertheless the occasional benefit of removing a totally functionless kidney has been established and the necessity for complete urographic study in early hypertension is accepted.

The renin hypothesis, and particularly the observation that a normal kidney seems to neutralize the power of an ischemic kidney to elevate blood pressure, led Harrison and Page to prepare kidney extracts, at first crude, and then pure enough to use for therapeutic trial in man. These extracts can reduce blood pressure but even with the same method of extraction their effectiveness is unpredictable. Local tissue reactions and fever are common. Reports by Chasis et al. (38), Schales et al. (39) and others attribute their effect on blood pressure to a non-specific foreign protein reaction. In hypertensive patients these reactions are unpredictable as to severity and may be dangerous. At the present time none of these extracts are dependable enough or safe enough for general distribution.

A subdivision of the humoral hypothesis, not so far mentioned, suggests (40) that the pressor material responsible for hypertension is one or more of the pressor amines, which might be released when ischemia interferes with the action of enzymes such as decarboxylase and particularly amine oxidase which has been found in kidney tissue. These enzymes, acting for example on di-hydroxyphenylalanine in the presence of oxygen produce dihydroxyphenyl acetic acid, an inert substance, whereas in the absence of oxygen there appears instead hydroxytyramine, a pressor substance. As with the renin sequence, demonstration of amines in the blood of hypertensive patients has been claimed, but not so far verified by wide testing. It must be recalled that while tyramine elevates blood pressure it reduces skin temperature and does not therefore duplicate the hypertensive state so closely as renin does. A preparation of tyrosinase, which destroys these amines in the test tube, has also been investigated with respect to its effect on hypertension (41) but in this instance, too, foreign protein reactions are prominent. Moreover, preparations of tyrosinase after boiling lack the enzyme, but retain the foreign protein effect and still reduce blood pressure in an unpredictable fashion (42).

The surgical treatment of hypertension has had

a checkered career, influenced by the procedure used, by the stage at which operation was done and in part by the amount of emphasis placed upon the humoral or nervous factors concerned. Unilateral nephrectomy has already been mentioned. Omentopexy, while helpful in animals with one grossly narrowed area in the renal artery, has not been helpful in man where there are many microscopically narrowed arterioles close to the glomeruli. Subtotal adrenalectomy has been tried and discarded. In general it is safe to say that anterior root section and supradiaphragmatic splanchnicectomy have been superseded by the combined dorso-lumbar sympathectomy and splanchnicectomy as used by Smithwick (43). In fact this last operation has not only proved to be a reasonably good therapeutic measure but has already contributed valuable information concerning the important, early, in vivo stages of hypertension because the anatomical approach permits inspection of both adrenal glands as well as inspection and biopsy of both kidneys.

Castleman and Smithwick (44) reported very recently a series of renal biopsies from one hundred hypertensive patients ranging in age from 18 to 56 years. Their average systolic pressure was 210 mm. Hg, and the average diastolic 130. The group included all the customary clinical gradations of kidney function and retinal angiosclerosis, representing a well balanced distribution of living hypertensive patients. The most striking finding in this biopsy study was the high percentage of cases in which there was no renal disease or minimal renal disease. Of the 100 cases, 28 had histologically normal kidneys. In another 25 the organic vascular disease was too slight to be solely responsible for hypertension. This was borne out by studies of renal blood flow in 20 of these patients by Talbott et al. (45). Smithwick recognized that a small biopsy might be misleading and with special care selected representative regions. In 25 instances bilateral biopsy specimens were examined with similar results in each pair. It was concluded that in over half of their cases hypertension must have been due to some functional vascular disturbance and not to organic disease of the renal vessels. They recall the conclusion of Smith based on studies of renal blood flow that there exists a perturbation of vascular function which antedates the destruction of renal parenchyma.

Despite the mass of indirect evidence in favor of the humoral concept, and despite the inability to demonstrate abnormal activity of the sympathetic nervous system, it is clear that vasoconstriction of vasomotor origin is superimposed periodically upon the high basal arteriolar tone characteristic of hypertension, just as is the case in the transient physiologic elevations of blood pressure in normal individuals. It is agreed clinically that mental and physical rest produce a significant reduction of blood pressure in many hypertensive patients. The adverse effect of nervous tension, emotional stress and anxiety indicates that even though the fundamental abnormality may finally be proved humoral in origin, the sympathetic nervous system, while normally carrying out its normal responses, can still accentuate the grade of hypertension and accelerate its advance.

When we examine the vascular responses of hypertensive patients we find that the arteriolar constriction is not nearly so vigorous nor so rigid as that of epinephrine because metabolites, the axone reflex and other vasodilator stimuli abolish that constriction easily, though temporarily, whereas the constriction of epinephrine holds fast against many of these physiologic dilator influences. Mechanical stimulation of the carotid sinus reflex reduces the blood pressure of the hypertensive patient abruptly, though temporarily. The persistence of the weaker agent responsible for hypertension may force the moderator mechanism to adjust to a higher resting level, though for brief periods the depressor reflex can still reduce blood pressure.

Conversely, because the constriction of hypertension is not maximal, normal constrictor impulses from the sympathetic nervous system can easily increase peripheral resistance still further with excitement, pain, exercise and even simple standing, as Smithwick has shown very clearly. These observations lend great weight to his conclusion that even in established diastolic hypertension a postural hypotension can be produced by a sufficiently extensive sympathectomy and will be helpful, particularly in young patients with a high diastolic pressure. Smithwick summarizes the surgical viewpoint as follows: "When the indications for operation are clearly defined it is to be expected that a high percentage of carefully selected patients will benefit as judged by persistent and significant lowering of blood pressure levels. There can even now be no doubt that life expectancy has been increased in cases of malignant hypertension and in patients with severe retinitis who have been

subjected to adequate surgery before renal and cardiac functions have been seriously impaired. At the present time, surgery appears to offer the greatest hope for these patients."

The mortality from such operative treatment by a surgeon experienced in the field is small. It seems likely that sympathectomy should be recommended more often and much earlier, even though evidence available now still indicates that sympathectomy represents symptomatic rather than etiologic treatment. The careful selection of cases will require a closer consultative relationship between investigator, physician and surgeon thereby focussing attention upon the *earliest stages* of hypertension. This in itself should have the desirable result of speeding the development of more specific and direct therapy based on etiology.

LITERATURE CITED

(1) Goldblatt, H., J. Lynch, R. F. Hanzal and W. W. Summerville: J. Exp. Med., **59**: 347, 1934.

(2) Houssay, B. A., and J. C. Fasciolo: Rev. Soc. Argent. Biol., **13**: 284, 1937.

(3) Freeman, N. E. and I. H. Page: Am. Heart Journ., **14**: 405, 1937.

(4) Glenn, F. and E. P. Lasher: Am. J. Physiol., **124**: 106, 1938.

(5) Dock, W.: Am. J. Physiol., **130**: 1, 1940.

(6) Dock, W., F. Shidler and B. Moy: Am. Heart Journ., **23**: 513, 1942.

(7) Tigerstedt, R. and P. G. Bergman: Skand. Arch. f. Physiol., **8**: 223, 1898.

(8) Landis, E. M., H. Montgomery and D. Sparkman: J. Clin. Investig., **17**: 189, 1938.

(9) Prinzmetal, M. and C. Wilson: J. Clin. Investig. **15**: 63, 1936.

(10) Pickering, G. W.: Clinical Science, **2**: 209, 1936

(11) Grant, R. T. and H. E. Holling: Clinical Science, **3**: 273, 1937-8.

(12) Wilkins, R. W. and L. W. Eichna: Bull. Johns Hopkins Hosp., **68**: 477, 1941.

(13) Abramson, D. I., and S. M. Fierst: Am. Heart Journ., **23**: 84, 1942.

(14) Schales, O.: Journ. Am. Chem. Soc., **64**: 561, 1942.

(15) Harrison, T. R., A. Blalock and M. F. Mason: Proc. Soc. Biol. and Exp. Med., **35**: 38, 1936-7.

(16) Prinzmetal, M., and B. Friedman: Proc. Soc. Exp. Biol. and Med., **35**: 122, 1936-7.

(17) Landis, E. M.: Amer. Journ. Med. Sci., **202**: 14, 1941.

(18) Pickering, G. W., M. Prinzmetal and A. R. Kelsall: Clinical Science, **4**: 401, 1942.

(19) Kohlstaedt, K. G., I. H. Page and O. M. Helmer: Am. Heart Journ., **19**: 92, 1940.

(20) Braun-Menendez, E., J. C. Fasciolo, L. F. Leloir and J. M. Munoz: Compt. Rend. Soc. Biol., **133**: 731, 1940.

(21) Houssay, B. A.: Medicina, **1**: 167, 1941.

(22) Landis, E. M., W. A. Jeffers and E. H. Shiels: Am. Journ. Physiol., **128**: 672, 1940.

(23) Dexter, L.: Ann. Int. Med., **17**: 447, 1942.

(24) Houssay, B. A., E. Braun-Menendez and L. Dexter: Ann. Int. Med., **17**: 461, 1942.

(25) Page, I. H.: J. Exp. Med., **72**: 301, 1940. Amer. Heart Journ., **23**: 336, 1942.

(26) Landis, E. M., J. E. Wood, jr., and J. L. Guerrant: Am. Journ. Physiol., **139**: 26, 1943.

(27) Janeway, T. C., H. B. Richardson and E. A. Park: Arch. Int. Med., **21**: 565, 1918.

(28) Thomas, E. D.: Unpublished observations.

(29) Abell, R. G., and I. H. Page: J. Exp. Med., **75**: 305, 1942.

(30) Steele, J. M., and E. Kirk: J. Clin. Investig., **13**: 895, 1934.

(31) Kapp, F., C. K. Friedland and E. M. Landis: Am. Journ. Physiol., **131**: 710, 1941.

(32) Taggart, J., and D. R. Drury: J. Exp. Med., **71**: 857, 1940.

(33) Eichna, L. W., and J. Bordley, III: J. Clin. Investig., **21**: 711, 1942.

(34) Hortenstine, J. F., and E. M. Landis: Unpublished observations.

(35) Griffith, J. Q., Jr., E. Roberts and H. O. Corbit: Amer. Heart Journ., **21**: 47, 1941.

(36) Smith, H. W.: Lectures on the Kidney, Univ. of Kansas Press, Lawrence, Kansas, 1943.

(37) Corcoran, A. C., and I. H. Page: Am. Journ. Physiol., **126**: 354, 1939. **130**: 335, 1940.

(38) Chasis, H. W., Goldring and H. W. Smith: J. Clin. Investig., **21**: 369, 1942.

(39) Schales, O., E. A. Stead, Jr. and J. V. Warren: Am. J. Med. Sci., **204**: 797, 1942.

(40) Holtz, P., and R. Heise: Arch. exp. Path. u Pharmakol., **191**: 87, 1939.
Bing, R. J., and M. B. Zucker: J. Exp. Med., **74**: 235, 1941.

(41) Schroeder, H. A., and M. H. Adams: J. Exp. Med., **73**: 531, 1941.

(42) Prinzmetal, M., G. A. Alles, C. Margoles, S. Kayland and D. S. Davis: Proc. Soc. Exp. Biol. and Med., **50**: 288, 1942.

(43) Smithwick, R. H.: Surgery, **7**: 1, 1940.

(44) Castleman, B., and R. H. Smithwick: Journ. Am. Med. Assoc., **121**: 1256, 1943.

(45) Talbott, J. H., B. Castleman, R. H. Smithwick, R. S. Melville and L. J. Pecora: J. Clin. Investig., **22**: 387, 1943.

Symposium on the Early Diagnosis of Cancer*

I. Anorexia and Weight Loss

By T. GRIER MILLER, M.D.

ANOREXIA and weight loss are frequent manifestations of carcinoma of the stomach. Often, however, neither of these phenomena develops in the early stages of the disease. I have just had under observation a woman of thirty years whose weight had finally reached 217 pounds and whose chief pleasure, her dissipation as she herself said, consisted in the ingestion of enormous meals; at operation she was found to have a gastric cancer. This patient, like many others, had only the symptoms of ulcer, and she did, as a matter of fact, have an ulcerating carcinoma. But even when no ulceration is present, either primary or secondary, and when the malignant lesion arises de novo or on a gastritis or polyp basis, no symptoms indicative of its nature may develop until the cancer is well advanced. Indeed no obtrusive symptoms of any kind may precede the discovery of an epigastric mass or a severe anemia. Sixteen years ago a Philadelphia surgeon, now alive and 78 years of age, consulted me because on the preceding day, while on a consultation in another city, he had for the first time become nauseated and had vomited, previously having had only the vaguest sort of indigestion, to which he had paid no attention; mere inspection of his abdomen disclosed an irregular epigastric mass and subsequent operation revealed that it was due to an extensive carcinoma of the lower half of the stomach.

Long ago, however, we had to abandon the palpation of a tumor in the stomach region for the primary diagnosis of gastric malignancy, and now, I think, we must give up the idea that its early diagnosis can be made, or even suspected, on the basis of specific symptoms, even anorexia and weight loss.

The only hope for a significant increase in the early recognition of cancer of the stomach, as I see it, lies in more frequent roentgenological examination of the upper digestive tract. Until that becomes a routine procedure in the investigation of all patients with digestive symptoms the only further decrease in the mortality will depend largely, as it has during recent years, on improvements in operative technique. One doubts if much more can be anticipated on that basis.

Some physicians have advocated a roentgenological examination of the digestive tract annually in every person over 40 years of age, just as Dr. [Catharine] Macfarlane has made an annual pelvic examination in a group of women for the early diagnosis of genital cancer and as microfilms of the chest for the detection of early tuberculosis are now being made routinely in many large groups of young people. Such an annual x-ray examination of the gastrointestinal system, however, is manifestly impossible, but, and this seems to me more important and more practical, if every patient who consults his physician for any of the symptoms of indigestion could have at once a screening roentgenological study of the stomach and duodenum many peptic ulcers that now go unrecognized would be discovered, when simple medical treatment would cure them, and many gastric cancers would be found months, perhaps years, before they could otherwise be diagnosed. Such a routine procedure would, I believe, bring about a great advance in gastro-enterological diagnosis.

With the increase in the number of trained roentgenologists who will be available after the war, with further improvement and simplification of x-ray technique and with the realization, chiefly by the roentgenologists themselves, that often only a fluoroscopic inspection, together with a few films, is all that is necessary in the average case to determine whether or not a gastric or duodenal lesion is present, we have a right to expect an earlier diagnosis of gastric cancer in the future.

Already the informed patient himself is begin-

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ning to demand such a study, and certainly the average practitioner will welcome the opportunity to have such data as the radiologist can supply on all his digestive cases. The trouble to date has been the expense and time involved. These factors, however, may become less formidable. Already some roentgenologists, aware of its importance, are making, on request, a purely survey investigation, at greatly reduced cost, with the understanding that, when it is indicated, a more elaborate study will follow.

This tendency toward screening investigations will undoubtedly become common, because if the profession itself is not prepared to provide, for both the rich and the poor, an adequate medical service, including some scheme for the earlier diagnosis of cancer, we must expect that the public will bring it about by legislation. Our people no longer look to charity for universal medical care; the insurance system necessarily limits itself to a special group; taxation alone seems to offer the solution. The sudden complete socialization of medicine, however, is neither desirable nor practical. And yet it can be delayed only by the adoption of procedures that give the public the sort of medical service it wants and deserves at a reasonable cost.

With specific reference to cancer of the stomach, the public is rapidly beginning to realize that this affection kills more persons than any other malignant disease (about 125,000 yearly in the United States), that it is curable if diagnosed early and that in most instances early diagnosis by the x-ray is possible; at the same time the informed public is aware of the fact that today we are saving, even with our best surgical technique, only about 6 per cent of the diagnosed cases. According to the Mayo statistics, 43 per cent of the cases, when diagnosed, are inoperable, 22 per cent, on exploration, are found in a hopeless condition, and another 10 per cent can have only a palliative procedure that at best prolongs life for a short time, this leaving only 25 per cent that may be resected. Only a third of these resected cases live as long as three years; only a fourth, or 6 per cent of the entire group, live as long as five years. While such a situation exists we cannot expect the average citizen to be satisfied. Consequently labor organizations, social agencies, and the public are preparing to play a part in our professional activities. We cannot blame them unless at the same time it is obvious that we ourselves are making every human effort to remedy the situation. I do not believe we will be doing that until we insist, and render it possible, that every patient who commits himself to our care and who has any of the symptoms of indigestion gets an x-ray examination of his stomach and duodenum. Herein lies an opportunity to reduce the mortality from gastric cancer and a challenge to our good faith as the protectors of the public's health.

II. Change in Bowel Habit

By HENRY L. BOCKUS, M.D.

UNFORTUNATELY subjective complaints rarely occur early in association with malignant lesions of the gastro-intestinal tract. For this reason very early malignant lesions are discovered only by chance or by a comprehensive periodic health survey. Since in the truest sense early symptoms are uncommon, one must be on the alert for those clinical manifestations suggesting carcinoma when they first appear. One of the very first symptoms in many patients with alimentary tract malignancy is a change in bowel habit. Naturally when one is thinking in terms of carcinoma, this clinical manifestation suggests, first of all, a malignant lesion in the colon. However, not infrequently a change of bowel habit occurs as an important symptom of tumors elsewhere in the abdomen.

Bowel symptoms are present in approximately 50 per cent of all patients with *gastric carcinoma.* Although it is true that "change in bowel habit" rarely constitutes an early or first symptom in cancer of the stomach, occasionally it may be the most striking subjective complaint. For example in diffuse scirrhous gastric carcinoma, diarrhea may be the first and most prominent clinical manifestation, occurring before the local more characteristic symptoms become manifest. Constipation is present in almost 50 per cent of patients with carcinoma of the stomach when they are admitted to a hospital. This change in bowel habit may depend upon various factors. One of the most common is the restricted diet due to anorexia, fear of eating, or to distress following the eating of solid food. In other instances con-

stipation is the result of a concomitant functional colonopathy, induced by anxiety or by abdominal pain. Occasionally the growth may extend from the stomach to the transverse mesocolon or colon, giving rise to constipation. Rarely the change in bowel habit may be due to involvement of the innervation of the colon by the growth. The significance of the colonic symptoms in a number of patients with gastric carcinoma is emphasized by the fact that, not infrequently, the clinician directs his diagnostic search primarily to the colon.

When unassociated with jaundice, *carcinoma of the pancreas* often presents a difficult problem to the diagnostician. It is not an uncommon experience to treat patients with carcinoma of the pancreas for diarrhea over a period of several months before the true nature of the disease is discovered. Quite a few patients with carcinoma of the body and tail of the pancreas are suspected of having merely an irritable colon for many months, since the only symptoms of consequence are abdominal pain and perhaps distention associated with borborygmus relieved often by bowel evacuation or the expulsion of flatus. An important fact to keep in mind in this connection is that irritable colon symptoms occurring for the first time in patients of middle or late life are often due to an organic lesion rather than a purely functional disorder.

Malignant lesions invading the *cul-de-sac anterior to the rectum* may have as their primary clinical manifestation a change in bowel habit. Occasionally carcinoma of the stomach wil remain quiescent until permeation metastasis has occurred low down in the pelvis. Lymphomas of various types may achieve sufficient size in this location to cause compression of the rectosigmoid or to interfere with the innervation of the lower colon and rectum. Malignant tumors of the pelvic organs may likewise be present occasionally with symptoms which suggest a primary site of disease in the lower colon. The occurrence of malignant infiltration in the cul-de-sac in front of the rectum emphasizes the great importance of routine rectal examination. Not infrequently I have first suspected the presence of a distant malignant lesion by being able to palpate a tumor in the cul-de-sac by making pressure against the anterior wall of the rectum (Blumer's shelf).

Small bowel lesions, although relatively rare, usually manifest their presence initially by symptoms of partial bowel obstruction or bleeding. The initial complaint in many instances is either constipation or diarrhea.

MALIGNANT TUMORS OF THE COLON AND RECTUM

The occurence of a consistent change in bowel habit in a patient beyond the age of forty years should always suggest the possibility of a malignant lesion of the colon. Cancer of the colon is responsible for approximately 27,000 deaths in the United States of America annually. The incidence of cancer of the colon and rectum between 1910 and 1940 has doubled in men and increased by 50 per cent in women. The age factor takes on great importance in the appraisal of bowel symptoms. From 85 to 90 per cent of colonic carcinomas occur in patients beyond the age of forty years; 60 per cent occur in those beyond the age of fifty years but one should not lose sight of the fact that 5 per cent of cancers of the colon and rectum develop in persons less than thirty years of age.

In carcinoma of the *right half of the colon* a change in bowel habit rarely occurs as the initial symptom. However, when these patients are seen constipation is present in 25 per cent, diarrhea in 25 per cent, and an alternation between constipation and diarrhea in perhaps 5 to 10 per cent of the cases.

In the *left half of the colon*, where colonic malignancy occurs more commonly, the symptom "change in bowel habit" is exceedingly important. It constitutes the first symptom in the majority of cases. Constipation is present in over 50 per cent of patients with cancer in this location at the time of their admission to the hospital. Diarrhea occurs in a large number, particularly with the advent of increasing obstruction, ulceration of the growth, and the frequent use of laxatives to overcome the constipation.

In *malignant lesions of the rectum* a change in bowel habit is an outstanding symptom. Here constipation occurs in 55 to 60 per cent and diarrhea in 10 to 15 per cent of the cases. In lesions low down a sense of incomplete evacuation and of tenesmus is quite common. Alternating constipation and diarrhea is certainly not rare, particularly in those patients who have become addicted to the use of laxatives.

Delay in Diagnosis: It is well to keep in mind the following facts: Approximately 50 per cent of patients with carcinoma of the colon and rectum who survive a radical operation are alive at the

end of five years. This means that in the neighborhood of 25 per cent of patients with carcinoma of the colon and rectum who are originally studied remain alive at the end of five years. This very hopeful situation maintains at the present time in spite of the fact that from *nine to twelve months elapse between the occurrence of the first symptom of carcinoma of the colon and rectum and the hospitalization of the patient.* According to Harms, Plant, and Oughterson the delay may be laid to the patient in 45 per cent, to the practitioner in 25 per cent, and to both in 30 per cent of the cases.

It is obvious that the laity require further education in the significance of symptoms which may be due to carcinoma of the colon and rectum. Errors on the part of the practitioner are further emphasized by the following: It has been estimated that about 20 per cent of patients with carcinoma of the rectum have been operated upon for hemorrhoids during the period of six months prior to the establishment of the diagnosis of carcinoma. From 10 to 15 per cent of patients with carcinoma of the right colon, according to some authorities, have been subjected to appendectomy after the onset of the cancer symptoms (this observation stresses the wisdom of a large incision when operation is performed for *a suspected acute appendicitis* in patients beyond the age of forty years). Even of greater significance statistically is the knowledge that palliative treatment for colitis, constipation, and diarrhea has been prescribed in almost 50 per cent of patients with carcinoma of the colon and rectum for varying periods of time without resort to definitive diagnostic procedures. This state of affairs is extremely unfortunate when it is realized (1) that seventy-five per cent of carcinomas of the rectum are within the reach of any adult finger; (2) that seventy-five per cent of all carcinomas of the colon may be inspected through a 10″ sigmoidoscope; and (3) that ninety-five per cent of all carcinomas of the colon above the rectosigmoidal region may be diagnosed by an expertly applied barium enema.

In conclusion it is probable that, if laymen were educated to consult a physician within one month after the onset of symptoms and if the physician so consulted utilized only digital rectal examination, proctosigmoidoscopy, and barium enema, the curability rate of carcinoma of the rectum and colon would be doubled.

III. Hematuria

By ALEXANDER RANDALL, M.D.

IT IS truly fitting that such symposia as this be held, and that periodically stock be taken on the subject of cancer, in order that we may all know of the progress that has been gained in the fight against it. Perhaps I may digress a moment to say that, according to Mr. Noah Webster, a symposium means a "drinking together"; hence we are here tonight to drink deeply of the common cup of knowledge.

I think perhaps it is not so wise that the subject be chosen and assigned, but rather that the speakers be chosen and be allowed to select their subjects. I, for instance, believe the field of Urology has a greater measure of importance to deliver today, than the subject of "Hematuria" that has been assigned to me. I refer to the relationship between gonadal function and prostatic malignancy so recently developed in Urology; but perhaps that belongs more properly to the Endocrinologist.

The relationship between hematuria and malignancy has always been close and most important. Howard A. Kelly lists 68 possible causes for the symptom of hematuria; to which I might add 21 more, and we should start by dividing the subject into those causes that are intrinsic to the urinary tract and speak for an intrinsic lesion, and (2nd) those that are especially extrinsic in their origin and source. Certain it is that few symptoms are as startling or alarming, or as search demanding as the appearance of blood in what has, all of one's life, been a clear urine, and it is startling to report to you that students have found that 4½ years is the average time between its occurrence and the earnest search for its cause and its explanation. This undoubtedly is due to the fact that it is at first always transitory in its occurrence, both in the male and in the female, and because in the latter menstrual bleeding is readily incriminated, or the physician prescribes something, and its use is accredited with cure, with the result that our worries, both physician and patient, go to sleep until its inevitable recurrence.

We teach our students that "hematuria spells cystoscopy and urography"—but what good is that if we stop there, do indifferent work, or fail to trace small defects observed. Better it is if

we realize that, while a score or more of unimportant causes may be at fault, renal tumors, stone and tuberculosis (all lethal) frequently first announce their presence by voiding blood. The frequency of hematuria is reported by Herman as 21 per cent in 3800 urological admissions at the Pennsylvania Hospital; while in 150 cases of surgical renal disease the incidence went up to 43 per cent macroscopic and 61 percent on microscopic study: among the hospital's general admissions the incidence was 4 per cent (3.9 per cent): therefore, hematuria is rare in general practice, but prominent and frequent in urologic cases. To clear your ideas, Young says that it is much more frequently a symptom in benign prostatic hypertrophy than in prostatic carcinoma, and his three-glass and five-glass tests aid the busy practitioner tentatively to fix the possible origin of blood. While Wade of Edinburgh emphasizes the fact that when a case of hematuria comes under observation it is the physician's duty to demand that the cause of the bleeding be forthwith determined. This may necessitate a somewhat tedious examination, but the ultimate result is certain. Fortunately, in most cases, when the cause of the bleeding has been determined, a speedy and certain cure can be obtained. In others, especially when malignant disease is present, the outlook is graver. In all of them, however, the earlier the diagnosis is arrived at, the better will be the result of treatment, and in all of them, whether they are benign or malignant, the progress of the case afterward should be followed up by re-examination at regular intervals of three months, six months and a year. It is difficult to persuade patients, who have been pronounced cured after operative treatment, of the necessity of this, and the temptation sometimes is to dismiss them with a reassurance that all is well for all time. Fortunately, in many this will prove to be correct, but slight recurrence may take place in others and, if so, by an accurate follow-up system such recurrence can be observed at its earliest stage and dealt with simply and promptly.

Experience with 933 cases has led Kretschmer to regard hematuria as only a symptom, but, he says, it should always be considered as indicative of the presence of serious organic disease in the genito-urinary tract. Every case of hematuria should be subjected to complete, comprehensive genito-urinary examination to determine, first, the origin of the blood and, second, the cause of the bleeding. There is never any justification for treating cases of hematuria on a purely symptomatic basis. His series proves the important assertion that the most frequent causes of hematuria are tumor, stone, tuberculosis, infection and nephritis.

IV. Cough and Bloody Sputum

By EMILY LOIS VAN LOON, M.D.

COUGH and bloody sputum are symptoms which may occur in any chronic chest disease; they always suggest serious trouble and call for thorough and extensive study. History, physical examination, X-ray and bronchoscopy may all be needed to determine the diagnosis. Tuberculosis is still the most common cause of cough and hemoptysis, but it is only one of many pathologic conditions with these symptoms. Heart disease has been considered as ranking second only to tuberculosis as cause for hemoptysis. In searching for explanation of hemoptysis in 436 non-tuberculous, non-cardiac cases, Jackson and Diamond found bronchiectasis most frequent, followed, in the order named, by carcinoma of the bronchus, then tracheobronchitis, pulmonary abscess, pneumonitis, and adenoma.

Since tonight we are discussing carcinoma, we will consider cough and bloody sputum only as it occurs in carcinoma of the bronchus, a condition called by Overholt, "the great masquerader of pulmonary disease."

The incidence of carcinoma of the bronchus is undoubtedly increasing, for it is reported at autopsy with greater frequency each year. Perrone and Levinson state that 10% of all carcinomas found at autopsy are in the lungs, the incidence being second only to carcinoma of the gastrointestinal tract. While the cancer age is presumably 40 to 60, Holinger reports 125 cases in patients from 6 years of age to 76, with the greatest incidence from 55 to 59.

Probably the most constant early symptom of bronchial carcinoma is chest discomfort or actual chest pain. It is confined to the side of the lesion, and is seldom affected by deep breathing.

Cough is an early but not a constant symptom, usually it is dry and spasmodic in the beginning.

In the advanced case, secondary infection and obstruction to drainage will cause profuse, foul sputum. The sputum is blood streaked or frankly bloodly when the tumor reaches the ulcerative stage. Therefore hemoptysis is seldom an early symptom; in the 82 cases of hemoptysis from bronchial carcinoma mentioned by Jackson and Diamond, it was the initial symptom in only four.

Another symptom which is usually late but may be the first one noted by the patient is hoarseness. It was the initial symptom in 7 of Holinger's 125 cases. Usually it is due to pressure of the tumor on the recurrent laryngeal nerves, but it may be due to involvement of the larynx itself.

A most important early sign of bronchial carcinoma is the presence of a wheeze; important because it is sometimes the only symptom of a small, still operable tumor.

A wheeze appearing for the first time in a patient of cancer age, should immediately make one suspect an intra bronchial tumor as the explanation. While X-ray is helpful in making a diagnosis, inspection of the tracheo bronchial tree with the bronchoscope is absolutely essential. Since wheezing is caused by partial obstruction of a bronchus, it is one symptom where the value of visualization offered by bronchoscopy can not be overestimated.

Dyspnoea is usually a late development, and may be due to pleural effusion, atelectasis or emphysema.

On physical examination, we find an early limitation of motion on the affected side. Fremitus is diminished, percussion note dull and breath sounds absent over the tumor mass, and over the area of atelectasis which so often develops distal to it. Rales may be present or absent.

X-ray findings are varied. There may be a dense mass near the hilum extending out from the bronchus. The mass is usually sharply defined, and may show radiating streaks out into the tissues.

Occasionally, we may find obstructive emphysema, with side-wise movement of the heart respiration. This occurs when the tumor is so situated that ingress of air is permitted but egress from the invaded lung is blocked.

Most significant of the X-ray findings however, is the presence of an area of atelectasis, most significant because it is so often found in the early case which is still operable. Such an atelectatic area calls for immediate bronchoscopy for inspection of the bronchus supplying the atelectatic area. One may find a tumor mass in the bronchial lumen, or find only irregular, bleeding walls. Sometimes the lumen is closed by extra bronchial pressure, and occasionally there is infiltration of all the tissues so that the area appears fixed and "frozen." Biopsy through the bronchoscope is a simple procedure, and has affected definite diagnosis in from 61 to 78% of bronchial carcinoma.

Even if the mucosa is not involved and biopsy is not obtainable, bronchoscopy will give the surgeon valuable information about the extent and location of involvement.

If the lesion is not suitable for bronchoscopic biopsy, definite diagnosis may be made by aspiration of the tumor itself, by biopsy of metastatic glands, by finding typical cells in the pleural fluid, or by surgical exploration of the chest.

Treatment may be by X-ray or by surgery. Most roentgenologists agree that X-ray only is palliative and that large doses may make the patient feel even more ill.

Widman in a study of 286 cases of proven bronchogenic carcinoma found that no patient who was untreated survived one year, while 18 who did have roentgenoray treatment lived from one to six years, so he concluded that treatment might prolong life for a year or more.

Until the last few years, early diagnosis of bronchial carcinoma was of little practical value, for the mortality was practically 100%. Now with the tremendous development of chest surgery, there is really an incentive for early diagnosis and the prognosis is growing brighter every year.

In a collected series of pneumonectomies for carcinoma reported in 1940, there was 65.5% operative mortality. Since then, the operative technique of mass tourniquet ligation has given way to individual ligation of the structures at the hilum which permits better visualization and more accurate surgery. Statistics show a most remarkable improvement.

Overholt, in a series of 127 cases of bronchial carcinoma, reports that 7 were diagnosed at autopsy, 65 had metastasis and were considered inoperable, 47 were apparently operable. Of these 47, 31 were finally found to be operable, and 16 inoperable. There were 9 operative deaths. Four late deaths, not from cancer, three late deaths, due to cancer. Thirteen are living, without metastasis, three of them for over 5 years after operation. Two are still alive, but have metastasis.

This means that 11% of the total 127 are apparently cured, and that 40% of the operable ones are apparently cured.

Other series by Graham and by Reinhoff show an operative mortality of 25%. Blades and Graham later reported 40 cases with 20% operative mortality.

With statistics like these in a condition which was formerly always fatal, we are encouraged to continue our efforts for early diagnosis.

V. Persistent Bone Pain

By PAUL C. COLONNA, M.D.

ONE of the most fortunate responses of the body to various pathological states is that of pain and persistent bone pain should always be given serious consideration. A history of injury may direct our attention to trauma as a cause of the pain; a history of malaise, temperature elevation, local swelling, and so forth, may make us think of an infectious process. The picture of early bone malignancy is complicated by the fact that certain types of bone tumors clinically resemble infection of bone and many patients with bone tumors give a history of injury. This may be often accepted—in the patient's mind at least—as the onset and cause of the bone tumor. We do not believe that a single injury is the direct or exciting cause of cancer, however, for it has never been so experimentally produced, but it is impressive to note the frequency with which a single trauma may appear to bring to light a preexisting bone tumor lesion.

In cancer of the soft tissues pain is not a cardinal feature as an early symptom and the patient should never be advised to wait for its appearance. Persistent bone discomfort, however, or pain early in bone tumors is not unusual and is probably produced by the pressure on the rigid, non-expanding walls of bone. This pain may at times be described as drawing in character, boring in character or rheumatic in type. While the pain may either develop gradually or come on suddenly or be intermittent it is a symptom of the utmost importance and warrants a careful search for its cause.

Because the necessity of having a uniform classification for bone tumors is obvious, we would like to stress the importance of using the grouping prepared by the Committee on Bone Sarcoma of the American College of Surgeons. This classification has been revised at intervals, the last revision being announced by Ewing in 1939, and as careful an adherence to this as possible will result in much valuable statistical information being collected. The great majority of primary malignant bone tumors fall within the osteogenic series, the long bones forming the lower extremity being the favorite site for many types of malignant bone tumors.

How may we improve our diagnostic acumen in the study of bone tumors? The great majority can be diagnosed correctly if we rigidly insist upon a careful history, a complete physical examination, adequate x-rays and pathological report on tissue removed.

HISTORY

A logically arranged and carefully evaluated history is always important in the diagnosis of any condition. The family history may be of considerable importance in the diagnosis of cancer. Although the inheritance of tumors in man is not established we do know that family susceptibility for malignant growths is frequently encountered. An involvement of the shaft or epiphyseal region of a long bone, with or without trauma, and accompanied by discomfort or pain in the region, loss of body weight, and limitation of motion in the involved joint area are all important signposts. If we can discover the time when the part last felt perfectly well, we may be able to roughly determine the time of onset of the suspected bone tumor.

PHYSICAL EXAMINATION

In the physical examination the general appearance of the patient may even at times be suggestive of malignancy. The physical examination must consist of a complete general examination as well as an investigation of the local area affected. In the case of a suspected metastatic lesion the other systems of the body may have to be investigated to determine the primary lesion. The veins in the skin over the involved region are usually enlarged and prominent and the skin may have a peculiar cyanotic redness which is striking. Investigation of the site, size, appearance, shape and feel of the tumor mass should be made. While

malignant bone tumors may occur in any part of the skeleton there are sites of predilection for certain types. The age of the patient also may be of definite value in the differential diagnosis. In tumors of bone as well as malignancies in other parts of the body early diagnosis and early treatment is always most important and unfortunately most difficult to obtain. The old proverb, "The more certain the diagnosis, the less certain the probability of cure," applies well to tumors of the osseous system.

The laboratory studies should routinely include a Wassermann or similar test, complete blood and urine examinations. The laboratory studies have proved of increasing value, particularly the blood chemistry determinations of phosphorus, calcium, phosphotase, protein, and so forth.

It is on the roentgenogram, however, that we have learned to depend for a diagnosis. In fact at times we may have leaned too heavily upon the roentgenologist's report, for while this valuable ally undoubtedly furnishes more data than any other one diagnostic aid, the roentgenogram must not be relied upon to the exclusion of all other data. It goes without saying that the picture should be as good as can possibly be obtained not only of the local lesion but sometimes of the opposite region as well. An x-ray of the chest should also be taken in suspected cases of malignant bone tumors and at times a complete survey of the other long bones may be advisable, but if our diagnosis rests largely upon only a satisfactory roentgenogram we will at times be in error.

THE PATHOLOGICAL REPORT

For many years there has been waged a rather bitter discussion concerning the pros and cons in the matter of tissue biopsy. To avoid open surgery on suspected lesions the punch biopsy has been useful in certain lesions, preferably those of the soft tissues, but the method has many limitations. A negative punch biopsy is not conclusive although a positive one may be very helpful. The removal of sufficient tissue by incision may have to be done and while we feel the dangers of a biopsy are at times very real, whenever a suspected bone tumor is surgically accessible and the diagnosis doubtful we have no hesitancy in recommending it. We would like to suggest that a great deal of benefit can be obtained, however, by having the radiologist and the pathologist present in the operating room when the tissue is removed for biopsy and the area for microscopic section jointly decided upon rather than expecting the pathologist alone to intuitively section the desired area.

Certainly with this array of data one might assume that a correct diagnosis can be made in all cases of bone tumors, but occasionally there is one other factor which enters into the picture. The subsequent course of the patient may, very rarely but occasionally, alter our original diagnosis and prognosis and make us realize that the passage of time is an important factor to prove or disprove our earlier diagnosis.

In certain large medical centers bone tumor clinics have been established and these have stressed the value of complete cooperation and coordination of all modern facilities for studying and investigating the special problems of bone tumor pathology. This phase of the subject is of great interest to the orthopaedic surgeon who of necessity not infrequently encounters both benign and malignant bone tumors in his treatment of bone and joint disabilities. The early diagnosis of bone tumors has not been stressed as much as the early diagnosis of cancer elsewhere.

In conclusion, therefore, the widespread dissemination of knowledge to the lay public concerning the signs and symptoms of bone cancer along with the unified study of this problem jointly by the clinician, the roentgenologist, the pathologist and the research worker will lead to more limbs and more lives being saved.

VI. Menopausal Bleeding

By LEWIS C. SCHEFFEY, M.D.

WHEN one considers the significance of so-called menopausal bleeding, it is necessary to take into account just what is meant by the term menopause. It is generally assumed that stoppage of the menstrual function is a synonymous term; actually it is not. While termination of menstruation is the most striking of the phenomena that accompany the climacteric, various other factors are of equal importance for reasons that will soon be apparent. I refer to the vasomotor, neurogenic, and constitutional symptoms that may not only accompany or follow the cessation of regular menstrual periods, but not infrequently precede it.

Normally, between the ages of 45 and 50, the menses should taper off gradually, with decrease in amount and periodicity until bleeding no longer appears. Hot flashes, alternating with chilliness and perspiration, nervous irritability, headaches, gastro-intestinal disturbances and changes in bodily contour, while not necessarily coincidental, may be manifested to a variable extent.

Not infrequently one or more of the phenomena mentioned are a source of annoyance while regular periods are still noted. Likewise the periods may become more or less profuse and irregular in character because of functional disturbance. When, however, such episodes tend to continue for more than a reasonable time, an organic cause is generally responsible.

Nearly everyone is familar with the efforts being made by lay and professional groups to bring home to the public, and to physicians as well, the potential danger that exists when irregular vaginal bleeding is ignored or not properly treated. While such an occurrence at the time of the menopause and thereafter is of the utmost significance, it is of equal importance to investigate abnormal bleeding in the earlier decades of life. That is why I have gone to some length to generalize upon the subject under discussion.

Functional disturbances of endocrine and constitutional origin, resulting in irregular uterine bleeding, are frequently seen following puberty and during the reproductive period. While carefully considered endocrine therapy, combined with rational general measures are often desirable and permissable for the control of such symptoms, they should be instituted only after a careful pelvic examination has excluded organic disease of the reproductive tract. I base this admonition on the fact that nearly one-third of the cases of carcinoma of the cervix that I have seen personally over a period of twenty years have occurred in women forty years of age or younger. In too many of these women the diagnosis was entirely missed or unduly delayed because the physician who first saw the patient either considered the lesion as benign or instituted medicinal treatment of some sort without even making a pelvic examination.

Most cases of malignant disease of the female genital organs do occur after the age of forty, and cancer of the uterus has the highest incidence, with cancer of the ovary and vulva in second or third place. In almost all instances of malignancy of the female genitalia, with the possible exception of the ovary, abnormal bleeding is the most significant and certainly the commonest early symptom.

In contrast to carcinoma of the cervix, most patients with carcinoma of the fundus develop it during the later decades of life, usually after the age of fifty, and post-menopausal bleeding is the predominant symptom. Bleeding at this time should always be regarded as due to carcinoma, either of the cervix but particularly of the fundus. Cervical carcinoma is more readily diagnosed, for abnormalities of the cervix are readily seen if properly inspected and examined, and a biopsy of the suspicious area will settle the matter. Bleeding occasioned by fundal carcinoma comes from a concealed lesion, for the cervix may be intact or atrophic, and curetage is necessary either to eliminate cancer of the uterine cavity, or to diagnose its presence.

Of course abnormal bleeding may be occasioned by a host of benign conditions. Cervical eversion, erosions, stricture or polypi may be responsible. Uterine bleeding of a functional nature, as seen in hyperplasia, so-called fibrosis uteri, endometrial polyps, and hypertension may also be causative factors.

Of especial concern, in relation to uterine malignancy, particularly of the fundus, are fibroid tumors giving rise to both menorrhagia, metrorrhagia, or both. Pain may or may not be an associated symptom. As a rule, interstitial and submucous tumors are more likely to cause irregular or excessive bleeding, while subserous ones

are more often responsible for painful pressure symptoms. The close association of fibroids and cancer of the fundus (35 to 50 per cent) must always be borne in mind when the bleeding is attributed solely to fibroids; otherwise inadequate treatment, either with irradiation or surgery, may result. Attention should especially be called to the danger of treating fibroids either with radium or with x-ray without an accompanying or preceding curetage to determine whether or not fundal carcinoma is present too. Only in this way can incorrect therapy be avoided, either by failing to administer sufficient irradiation, or by performing incomplete surgery, i.e. a subtotal hysterectomy instead of a total one. The possibility of overlooking fundal carcinoma when fibroids are thought to be the predominant lesion, is most likely to occur between the ages of 40 and 50, when menstruation has not yet ceased, but the bleeding is irregular and often profuse.

The modern thought today is that carcinoma of the fundus is best managed by preliminary irradiation followed by total hysterectomy, and removal of the adnexa six to eight weeks later. On the other hand, with the possible exception of the very earliest cases, cancer of the cervix is best treated in the vast majority of patients with x-ray and radium—and even in the early case the lesion should be irradiated before a truly radical Wertheim operation is decided upon.

Finally, a special warning should be voiced regarding the indiscriminate use of hormonal therapy in attempting to control abnormal uterine bleeding. Far too often, both by injection and by oral administration, hormonal preparations are employed without carrying out a thorough examination to determine whether or not an organic lesion is responsible for the bleeding. In this way both benign and malignant lesions are constantly being overlooked. Indicated and effective treatment is thus delayed until a desperate situation has arisen, with advanced malignancy in some instances or a benign tumor sapping the vitality of the host in others. Endocrine therapy, particularly with thyroid extract, may prove of some value in treating functional bleeding of endocrine or constitutional origin at puberty or in the early reproductive period. It has little if any place in the management of bleeding patients in the menopausal epoch, when surgical or radiological measures are much more specific. Even natural and synthetic estrogenic substances used for the relief of the vasomotor symptoms incident to the menopause may cause uterine bleeding in women who have already ceased menstruating, thus creating a confusing diagnostic problem, that often requires curetage to settle the question of possible malignancy.

Abnormal uterine bleeding, not only at the time of the menopause but at any period in a woman's life, demands prompt and thorough pelvic examination, adequate investigation and appropriate treatment.

VII. The Bleeding Nipple

By NORMAN TREVES, M.D.

"WHEN blood collects at the breast of a woman it indicates madness" stated Hippocrates in the fifth century B.C. Today in the twentieth century A.D. we say that the physician or patient who neglects this important sympton is either mad or ignorant.

Serosanguineous and sanguineous discharge from the nipple may occur spontaneously or may only be obtained by pressure over the breast. There is no other breast symptom which will provide such a compelling urge for consultation with the doctor. It may occur with or without a visible or palpable tumor. Nature in this instance has placed fear in its proper perspective relationship to actual conditions; for bleeding from the nipple in a large proportion of cases may be due to a benign or an early precancerous lesion and in a smaller proportion to an already well defined mammary cancer.

No one has claimed, except in the rare cases of true vicarious menstruation, that bleeding can come from a normal breast. And it is well at the outset to eliminate two extremely rare conditions which may give rise to a bloody discharge from the nipple. Sarcoma of the breast may produce it. But in none of the cases I have collected was bleeding from the nipple the initial symptom of this tumor. Severe direct injury to the breast may cause bleeding into a duct of the breast and result in a bloody discharge at the nipple. This condition, too, is to be excluded from this report as it belongs to the field of traumatic surgery. But in this connection it may be stated that breast

trauma has not been a factor in causing bloody discharge as an aftermath of an injury.

A bloody discharge from the nipple of a non-lactating breast occurs as an initial symptom in about 6 percent of the cases, but as an initial symptom of cancer of the breast bleeding was first noted in less than 2 percent of one thousand cases.

The situation may be clarified by the following statement: The presence of a bloody, or modified bloody discharge from the nipple is not an entity in itself. It may not be a symptom of any particular alteration in the mammary gland. Above all it is to be considered a symptom, sometimes the only symptom appreciable of disease of the breast.

A review of the literature indicates that serosanguineous or sanguineous discharge from the nipple has been a matter of dispute among surgeons and clinicians for a long time. A thin blood-tinged discharge has been regarded by many as an indication of duct papilloma; a frank sanguineous discharge of cancer and a darker discharge of duct stasis. All surgeons have agreed that the most frequent cause of bloody discharge from the nipple was the presence of a duct papilloma—32 percent in the present series. While all of the previous reports roughly divide the lesions which cause bleeding nipple equally as malignant and non-malignant, the present trend is to a greater difference—since duct papillomata and papillary cystadenomata are being recognized earlier and are operated upon before malignant change supervenes.

The discharge from the affected nipple should be smeared, stained and examined microscopically in each instance. This must be done to recognize the presence of red blood cells in the material, otherwise the secretion so obtained cannot be considered one of actual bloody discharge. The findings will then demonstrate true blood and distinguish it from the brownish, inspissated secretion which may occur in mastitis and duct stasis and frequently found in the terminal dilated ducts beneath the nipple and areola. The cases analyzed in this report have all been proven microscopically to have a discharge containing red blood cells.

The finding of blood at the nipple is more frequently found in low-grade and circumscribed cancer than in the more highly malignant neoplasms. It more commonly precedes the discovery of a tumor in this group of low-grade cancers. Frequently the discharge is a primary symptom and precedes the discovery of a tumor from three months to two or three years. In exceptional instances the discharge of blood from the nipple may precede the discovery of cancer for a greater number of years.

Every case, which has bleeding from the nipple as an initial or secondary symptom should be meticulously examined to determine the location of the duct or ducts from which the discharge arises. This can often be accomplished by careful palpation. Digital pressure or compression of the terminal ducts should be applied in a systematic fashion beginning at the periphery of the breast and consecutively examining the radii of the breast in a clock-wise sequence. The successive examination of various radii may determine the location or several sites at which the pressure may produce the discharge. Various investigators have advised the injection of a radio-opaque contrast medium into the duct systems by catheterization. The procedure is often difficult, is extremely trying on the nerves of an already distraught patient and is not without complications. We advise its use only in the most obscure instances and then only when every other means of identifying the lesion has been exhausted.

In the majority of cases where a benign lesion produces a bloody discharge it is found within or near the areolar border. Over fifty percent of the benign lesions of the breast producing sanguineous discharge are within the confines of the areolar border. About 45 percent are in the zone adjacent to the areola and about 2 percent are located in the periphery of the breast.

Transillumination does not permit a differentiation between a benign and a malignant tumor but will distinguish between a solid tumor and a cyst containing clear fluid. If the fluid is bloody or dark brown the tumor will be opaque. It will lead to the location of duct papillomas, cystadenomas and cystadenocarcinomas. Bloody discharge from the nipple may occur without any tumor appearing in the breast or may be the precursor of a visible or palpable lump. Its presence is easily demonstrable by transillumination. This clinical procedure consists in placing behind the breast a cold electric lamp and viewing the light transmitted through the breast, in a completely darkened room. *This examination must not be considered completely diagnostic.* It is a

valuable adjunct in arriving at a clinical diagnosis, leading to the localization of those solid tumors which occur in or near a duct in the breast. It will determine whether the bleeding arises from a single area of disease or from multiple tumors and may demarcate the duct from which blood escapes. Such information obtained may determine whether limited or more extensive surgery may be necessary to eradicate the cause of bleeding.

The use of *aspiration biopsy* is not to be relied on solely in arriving at a diagnosis in cases with a bleeding nipple. It is valueless where a bloody discharge appears without the existence of a palpable or usually demonstrable lesion. The indication for surgical intervention in the other instances is so clearly indicated that in most cases this diagnostic procedure would appear superfluous.

Occasionally the bloody secretion from one duct may be associated with a creamy discharge from one or more ducts in the affected breast often without a demonstrable lesion. At times a diffuse subareolar haziness may be demonstrated on transillumination. Since 15 percent of the cases of bleeding nipple have no demonstrable tumor the problem of caring for this type of lesion presents unusual difficulties. Many of these women are in the younger age groups. To eliminate the symptom would mean the removal of all breast tissue. Yet this seemingly radical approach may be advisable rather than risk an early carcinoma to remain undetected.

For the papillomas of simple or intracystic type a more positive approach may be indicated. These lesions, usually occuring in the central zone of the breast are from several millimeters to two centimeters in size. Surgeons of several decades past considered them as low grade papillary or duct cancers. And some pathologists still regard them as GRADE I cancer (usually helpful in boosting the five year survival rate). Local excision usually suffices for cure but some surgeons still practice local or radical mastectomy for this tumor. There may be some tenable rationale in the radical method of cure since bloody discharge occurs both in benign and malignant papillary tumors. The occurrence of blood in cystic tumors of the breast is another reason advanced for radical removal and since these tumors undergo malignant change if untreated another indication is advanced for radical mastectomy. Then, too, 20 percent of the cases of duct papillomas occur as multiple lesions and with the multiple lesions multiple local incisions may be contraindicated. The clinical and pathological findings in duct and intracystic papillomata should be familiar to all if we are to avoid needless radical measures in treating this condition.

Papillary cystadenoma and duct papilloma arise mainly within or at the areolar border. Pressure applied to this area may cause a bloody discharge. When no tumor is palpable the same test applied to various segments may produce exudate. This may be serous but continued pressure causes the appearance of blood. The papilloma in its incipiency causes no distention of the duct but later a cyst may develop and a cystadenoma form. At times the papilloma may protrude from a terminal duct. These two lesions occur in an earlier age group than cystadenocarcinoma. Rarely are there skin or nipple changes. Transillumination demonstrates a clearly defined opaque tumor.

Papillary cystadenocarcinoma is the stage where malignant degeneration has supervened. When the basement membrane has been invaded a carcinoma has its origin at this site. The same findings are present on transillumination as in the above.

Chronic periductal mastitis may produce a bloody discharge due to the proliferation of the lining cells of the duct. This may be comparable to minute papillomas. In several instances bloody discharge from one duct may be associated with inspissated material from one or more ducts in the same breast. At times no well defined lesion may be demonstrated on transillumination but a diffuse subareolar haziness is often present.

Carcinoma. Since Paget's disease of the nipple may begin with nipple or duct involvement a few cases have as an initial symptom a serosanguineous discharge. Duct carcinoma on the other hand frequently has as its initial symptom a dark bloody discharge possibly due to the stagnation of blood in the ducts. While many tumors occur in the periphery they ofttimes are diffuse and occupy the entire gland. Because of their solid consistence they are densely opaque on transillumination.

The following percentage distribution occurred in the 200 cases in this report:

Chronic periductal mastitis	15	Benign 56%
Duct papilloma	32	
Papillary cystadenoma	9	
Papillary cystadenocarcinoma	23	Malignant 44%
Duct carcinoma	19	
Paget's disease	2	

CONCLUSIONS

(1) In cases of bleeding nipple aspiration biopsy is of little value.

(2) The mere presence of bloody discharge from the nipple offers no presumptive evidence as to the exact type of the lesion. Bleeding, when present, is not of value as a differential diagnostic point. It is a warning sign of a malignant lesion or one which frequently terminates in cancer.

(3) Bleeding is of more significance as a warning symptom in a diffusely nodular breast than in a localized one. When it is present, complete removal will usually be the best treatment.

(4) Over half the bleeding nipple cases may be cured by the simplest type of surgery. Local surgery of this sort is *an important prophylaxis against cancer of the breast.*

(5) Coming more definitely to the question of what course should be advised for the bleeding breast, the cases may be divided into those with a tumor, whether demonstrated by palpation or transillumination, and those with no demonstrable tumor. In cases with tumor there is no argument. Every benign tumor should be removed lest it become malignant. Bleeding should not of itself stampede one into a radical mastectomy or even a mastectomy unless there are multiple lesions or other conditions which would of themselves indicate mastectomy even though bleeding were not present.

(6) In a bleeding breast with no demonstrable tumor it is exceedingly difficult to determine the best procedure. A safe line of attack would be to prove the nature of the process and having once determined it proceed with local or general surgery as indicated. If no tumors can be demonstrated the safest conservative surgical procedure is local mastectomy.

Some Roman Remedies in Italian Folkmedicine

By WALTON BROOKS McDANIEL

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INTRODUCTION

IN THE departments of learning that we call Classical Archaeology and Classical Philology few fields of study have been neglected. Most of them have been ploughed and harrowed and hoed and raked until it may well seem that little remains for a researcher to turn up. Such university teachers as must just so often justify their professorial existence by publishing an *opusculum lucubratum* of one sort or another have difficulty in startling even a university trustee.

At almost the beginning of my professional career I discovered to my surprise that my fellow gleaners had paid hardly any attention to one field for research that offered, so it appeared to me, alluring possibilities. No complete and systematic study had been made of the points of connection between the private life of the ancient Romans and that of their descendants in the Italy of our time. This discovery led me to spend years in travel, with sojourns of various length, in pretty much all parts of Italy and Sicily and several of the adjacent islands. I found, of course, many parallels and survivals. Many more were revealed by extensive reading in the voluminous literature of travel and description which native Italians as well as alien, although generally sympathetic, visitors have put forth during the last two centuries. About few countries of Europe have tourists been less able to refrain from publishing a book of complacent observations.

I judge that few of my own finds could be of more interest to the readers of this periodical than those which concern the art of medicine, not, however, the medicine of the schools, of scientific laboratories and of orthodox practitioners, but that which has served and disserved the more ignorant elements of society in all ages who have been prone to put their faith in the therapy of oral tradition, the prescriptions of empirics, and even the superstitious practices of magic. We must not forget that in the reign of Emperor Augustus there were countless poor wretches who had no access to Doctor Antonius Musa and in that of Marcus Aurelius to Doctor Claudius Galen whom the historians of medicine justly honor as the most influential writer on the subject in any age. Roman antiquity knew nothing of free clinics established for the indigent under the charge of competent physicians. The ordinary citizen was likely to consult the local herb doctor, or some glib-tongued Greekling whose smattering of knowledge from the books and exotic drugs would capture the morbid fancy of anybody, or some hoary crone who was heir to the folkmedicine of a long line of ancestors, or, if worse came to worst, an adept in the hocus pocus of magic.

Similarly in the Italy of our age there are to be found among the *popolino*, the commonalty of the towns, and among the peasantry in backward districts persons who when smitten by illness resort to the "wise woman" of their neighborhood, some aged *medichessa*, or to medicasters of either sex, *mediconi* or *medicone*, or, when legitimate or quasi-legitimate medicine seems to fail, to witch or warlock, *strega* or *stregone*. These adepts in the art that can still be pretty black treasure secret nostrums and agencies which they are ready to employ in the service of a client for only a small fraction of what would be the fee of a respectable specialist. Among many of the unlettered poor, indeed, scientific medicine is somewhat under suspicion, and it can be in very ill repute. Striking illustrations of this are readily forthcoming. For example, within my lifetime we have had unbelievable exhibitions of ignorance and indocility when cholera has visited Italy. Many in their utter consternation at its mysterious spread have opposed the sanitary measures taken by state physicians, being quite convinced that these devoted servants of the public were actually engaged in poisoning off undesirable citizens. Again, when general vaccination against smallpox has become imperatively necessary, officials have had to deal with mulish ignoramuses who thought that the doctors were deliberately disseminating the disease with the same end in view.[1] Such experiences re-

[1] H. T. Tuckerman, *The Italian Sketch Book*, 22–24; E. Neville-Rolfe, *Naples in 1888*, 75; L. Villari, *On Tuscan Hills*, 22; G. Pitrè, "Il colera nelle credenze

call accounts that ancient historians give us of epidemics of disease in Rome which the ignorant and credulous took to be nothing but successful attempts at wholesale poisoning.

In the medical literature that has reached us from Roman days, we cannot establish a sharp demarcation between a medicine of reason based upon somewhat scientific study and observation and one of superstition and mere empiricism. For example, in the *De Medicina* of Celsus upon which the most reputable physicians among his contemporaries might depend for knowledge of the best practice of the first century of our era, we find remedies mentioned which owe their recommendation largely to a belief in sympathetic magic, and among the *Compositiones* of Scribonius Largus there appear prime specimens of wholly superstitious receipts with no hint of any doubt in the compiler's own mind about their scientific value. And most important of all historically is that unnatural natural history the *Historia Naturalis* of Pliny the Elder, which, while it tells us much about the legitimate medicine of learned tradition, is at the same time our main source of information for the superstitions of folkmedicine, the pharmocopeia of thaumaturgy, the teachings attributable to the Persian *magi* and their followers, and the arrant impositions actually practised by those who went by the name of *magi* or "magicians" in the Rome of his day.

In view of all this I need not perhaps emphasize the fact that when we search for resemblances between the medical art of some two millennia ago and that of Italians of our period, we must pay little, if any, attention to the higher stratum of modern Italian society, which bestows its faith and its fees upon the same type of scientifically equipped physician that the well-to-do of every land employ, but rather center our investigations on the unprivileged poor. Among them we may expect to find the conservatism that commonly characterizes backward and unschooled people and so, for that very reason, many a survival of age-old superstition. Naturally, we shall not find our material in the technical books of the Italian practitioner but rather in treatises and articles published by researchers in the field of folklore.

While the private inquiries of an alien investigator can elicit little from persons who are made tight-lipped by consciousness of their own lack of education and social position, there have been in recent generations a considerable number of Italians who, living intimately with the common people and enjoying the confidence of even the most ignorant among them, could break through the barriers of secretiveness and so compile authoritatively an immense amount of lore and personal observations. Although the publications of these *folkloristi* are somewhat numerous, most of their books and articles are so rarely to be found in our libraries that our classical scholars are excusable for their almost complete neglect of this rich field of research. The notable paucity of references to Italian sources even in Sir James G. Frazer's monumental work "The Golden Bough" tells the tale. Fortunately, the Widener Library of Harvard University contains what is reputed to be the richest collection of works on folklore in existence anywhere. Those on the folklore of Italy have kept me pleasantly busy for many years.

Choosing a topic for this paper where so many choices available promised something of possible interest to a physician was not easy, but in this era when we flatter ourselves that we are very scientific, and when certainly everything is done to make medical treatment at least tolerable, if not agreeable (powerful synthetics, condensed into minute form, remedies sugar-coated or capsuled, rays shot mysteriously but painlessly into the body, hospitalization etc. etc.), it may be worthwhile to contemplate briefly a less prideful picture. Something besides the barbarism and stupidity of war should jolt us occasionally into a consciousness of how near mankind still is to the primitive. Let us see to what extent some of the more shocking and, at least at first thought, unreasonable medical doctrines and practices of which we learn from Latin writers of the early empire can be paralleled in the Italy of our time in folkmedicine, the therapy of quacks and other irregular practitioners, and the wonder-working of witchcraft.

We must remark at the outset that research in folklore can have little attraction for a mere precisionist, a person with a statistical type of mind, who has patience only with what is reasonable, factual, and reducible to something like scientific certainty. A folklorist has to associate and deal constantly with persons whose ways of thought and living are so subject to their inheritance of

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popolari d'Italia," *Archivio per lo studio delle tradizioni popolari* (henceforth abbr. *Archivio*) III, 589–595; esp. 590–591; *Medicina popolare siciliana*, 251; 373; cf. 375–385; Z. Zanetti, *La medicina delle nostre donne* (hereafter abbr. Zanetti), 94.

superstition, so prone to atavistic reversions, so under the control of mere emotion and impulse and so hard to rationalize that he can only guess at the reasons for many of their notions and actions. Certainty is often unattainable, and dubiety and caution are therefore desirable qualities in any scholar who ventures to speak or write about them. In that frame of mind I venture to write this article, a layman exposed to all the terrors of medical criticism.

It may seem almost needless to add that this article is not for anybody to read who is subject to Victorian squeamishness. It is intended for case-hardened Aesculapians whose clinical labors spare their senses no ordeal and whose scientific reading would be worthless if it were censored by a Doctor Bowdler, a Mrs. Grundy, or a finicky esthete. However, I shall begin with the least offensive of my materia medica, saliva, and descend to worse fatuities gradatim and with a degree of wariness that becomes my subject. I need hardly say that I have by no means exhausted my list of animal remedies.

SALIVA

Having myself lived through the spitoon age of American civilization when golden cuspidors worthy of man's ejectable secretion were the decoration of our proudest public buildings, and unregenerate youth envied the unerring aim of champion shots among their elders, I can, perhaps, write upon the peculiar importance and excessive use of saliva in ancient and modern Italy with more lenity and understanding than many who have known only this more sanitary age could show. When, for example, in the course of my travels I have observed an Italian of the lower classes in the doorway of his dwelling turn and spit into his own hallway rather than waste his saliva on the street in front of him, or seen his compatriot of a somewhat higher social status spit on the deck of our ship rather than over the rail where it would be lost in the wastes of ocean, I have recognized charitably that for him this excretion must have some especial value. My account of this last experience may well remind a reader of Latin literature of how the magician Tiridates, when invited to the court of Emperor Nero, brought great expense upon the Roman provinces through which he traveled because of his unwillingness ever to use the sea because the *magi* deemed it wrong to spit into it or let any other excretion enter it.[2]

When I have watched two Italians engaged in a hot fight in the midst of a circle of admirers, spitting alternately into each other's faces with a precision and rapidity that indicated long experience in such interchanges and an envied hypertrophy of the salivary glands, it has helped me to understand some of the usages of medicine and magic with which we have to deal.

Students of the classics know that spitting upon a person was a gesture of utter contempt or detestation[3] and a common method of venting anger.[4] In general, the ancient Romans like my Italian duellists would aim at the face. But if a man had been boasting or had otherwise been exhibiting an overweening pride, he might spit upon himself anywhere as an act of self-humiliation; for pagan gods were jealous gods, and when they noticed a mortal priding himself on some supreme success, or presuming in his hopes and expectations, they were likely to bring him low by some sudden disaster. It was advisable to avoid feelings of elation, but if such were inescapable, to placate Nemesis by insulting one's self in this symbolic fashion.[5]

But various allusions in Latin authors make us believe that spittle was regarded as something more than an ever-ready missile that was most offensive and maddening to receive at high velocity in one's eye, and the ejection of it upon one's person something more than an ancient equivalent of our "knocking on wood." Saliva in itself could be noxious and even deadly. Romans thought—and with some reason—that the bite of man was poisonous.[6] Why should not his spit be as venomous as that of a snake when it looked so much like it? Pliny assures us—but with no more reason that we should believe his word than usual—that when a snake is hit by a man's saliva—I am still reluctant to try this on a Florida rattler—it flees as if it had been hit by boiling water, and, if the saliva enters the snake's mouth, particularly when it comes from somebody

[2] Plin. *N. H.* 30. 16–17 (hereafter *N. H.* and the numerals).

[3] Petron. 132.

[4] Sen. *De Ira* 3. 38. 1–2.

[5] Cf., e.g., *N. H.* 28. 36; Petron. 74; Schol. on Juv. 7. 112.

[6] *N. H.* 28. 40.

who is fasting, the animal dies.[7] The greater potency of fasting spit is recognized today in all Italian superstition.[8] Another ancient writer declares that spittle will make a sea scolopendra, a toad or a frog burst asunder; Dr. Galen that it will kill a scorpion.[9] One of the most usual doctrines of ancient medicine is that the best antidote for poison is likely to be another poison, or something derived from a supposedly poisonous creature. One neutralizes the other. Accordingly, such things as the entrails or the fat of snakes, or powder made from them should be applied to wounds inflicted by their fangs,[10] and, in fact, to any wound.[11] For a similar reason, perhaps, spit was thought to act as a counter-agent upon the poison of a toad, scorpion, or venomous serpent.[12]

Belief in the lethal quality of human spittle and its power to put dangerous creatures to flight may be partly responsible for the idea that it can inhibit the approach of other perils and avert evils of all sorts. Accordingly, it was customary among the Romans to ward off the injuries of magic, the threats of an evil eye, peril from any place of previously experienced danger, or the possible effects of a bad omen by spitting and more particularly by spitting three times.[13] Naturally enough, the same thing was done as a protection against disease. A Roman would spit if he witnessed somebody falling in an epileptic fit.[14] It was the proper way to repel any contagion or infection. Furthermore, if one would increase the efficacy of a drug, it was well during the administration of it to spit away the ailment for which it was to be used.[15] Even as far back as Roman days there were those who believed that spitting on the hands would add weight to a blow.[16]

According to ancient ways of thinking, the saliva itself and not merely the ejection of it should be remedial.[17] For example, if a man's mind was filled with anxiety, he should transfer some spittle from his mouth on his finger to a spot behind his ear and thus gain relief.[18] Upon the first appearance of a boil, it was well to mark it with fasting spittle.[19] Even here we must not conclude that it was simply a physical or chemical property of the fluid that was deemed the essential factor in the cure. In other words, in such treatments it is to a large degree with a symbolic operation of magic and not with an invention of pharmaceutics that we have to do, although, in any given case, the operator himself may have been quite incapable of drawing a line between the agencies that were at work. Let my reader decide, for instance, upon the amount of credit that should be apportioned to magic and medicine when a man healed his snake bite with spittle,[20] or, in a fasting state, used his saliva on ringworms, leprous or cancerous ulcers, or ophthalmia,[21] or when the spittle of a fasting woman was applied as a curative to bloodshot eyes.[22] According to one of the best attested miracles of antiquity[23] Emperor Vespasian rid a man of blindness in Alexandria by spitting in his eyes. About one type of case, at any rate, there can be little dispute. When we are told that a cure for a pain in the neck is to convey saliva with the right hand to the ham of the right knee and with the left to that of the left,[24] we are dealing with an operation of magic just as much as when a superstitious person accompanied any charm or incantation with the gesture of spitting thrice.[25]

There are many Italians even among those who have enjoyed some educational advantages who still resort to expectoration for all the purposes of magic prophylaxis, but we need illustrate here only some of its modern uses in connection with the art of medicine in order to show how truly the spitters may be reckoned descendants of the *Romani* of two millennia ago.

[7] *N. H.* 7. 14–15; 28. 35; 28. 38.

[8] Cf., e.g., G. Amalfi, *Tradizioni ed usi nella penisola sorrentina*, 72.

[9] See L. Thorndike, *A History of Magic*, 1. 174.

[10] Cf., *N. H.* 29. 71 with Zanetti, 216.

[11] G. Cocchiara, *La vita e l'arte del popolo siciliano nel museo Pitrè*, 91.

[12] Cf., e.g., *N. H.* 7. 13; 28. 35. So the Psylli tried to save Cleopatra: Suet. *Aug.* 17. 4.

[13] Cf., e.g., Plaut. *Asin.* 37–39; Tib. 1. 2. 54; 1. 2 95–96; Petron. 131; *N. H.* 28. 38; Pers. 2. 31–34.

[14] Cf., e.g., Plaut. *Capt.* 550–555; *N. H.* 28. 35–36; cf. 10. 69.

[15] *N. H.* 24. 172; 26. 92–93.

[16] *N. H.* 28. 37.

[17] *N. H.* 28. 8; 28. 31.

[18] *N. H.* 28. 25.

[19] *N. H.* 28. 36.

[20] *N. H.* 7. 13.

[21] Cels. 5. 28. 18 B; *N. H.* 28. 37.

[22] *N. H.* 28. 76.

[23] Tac. *Hist.* 4. 81; Suet. *Vesp.* 7. 2–3. Saliva, well salted, was spat into the eyes of cattle: *N. H.* 31. 105.

[24] *N. H.* 28. 37.

[25] Cf., e.g., Tib. 1. 3. 53–54.

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Anybody who is at all acquainted with the occult doctrines of superstitious Italians will tell you that when you are about to leave a house or a bedroom of illness it is advisable to spit: it still keeps the visitor from contracting the patient's disease.[26] Furthermore, whoever administers medicine to him ought first to expectorate on the floor, or, if that happens to be contrary to family custom, out the window. The act indicates, I suppose, his hostile attitude towards the disease or the demon of it.[27] When the pains of parturition are torturing a woman and delivery is belated, some compassionate soul should spit from a window or balcony. This will break any spell or other form of bewitchment that has been thwarting her.[28]

But let us return to what is more strictly the field of medicine, or, if you will, of superstitious medicine and report that a victim of thrush merely needs to have a shepherd spit in his mouth in order to heal the ulcers.[29] The Neapolitan may use it for ringworm.[29*] Saliva is still an antidote recommended in a case of snakebite.[30] Moreover, it is valued as an ever-ready remedy for ophthalmia in human beings or in swine.[31] In some cases of conjunctivitis it is used merely for the purpose of fastening a red wafer on each temple: the eye itself is left dry.[32] And so we might go on honoring with our attention this dynamic secretion of our salivary glands, but perhaps it is time to note the place that age-old superstition assigns certain other products of *homo sapiens—et salivans*.

EARWAX AND PERSPIRATION

From the point of view of delicacy and decency, if not of medical utility, we are perhaps taking a step downward when we deal next with earwax and perspiration as remedies that have had some vogue during the two periods under our consideration. We learn that the first mentioned stuff, which the Romans aptly enough termed *sordes*, was a proper application to cure the sting of a scorpion or bites that had been inflicted by snakes or by human beings in a fight. The most potent would be, of course, as all occult lore would indicate, some from the victim's own ear. Such wax was also prescribed as a good cerate to smear on hang-nails[33] and to use as an unguent on the inflammation of erysipelas.[34]

Now, while we may excuse the use of earwax in salves and ointments at a period when oleaginous substances were not so available, there is less justification for it in the Italy of our time. Among the Abruzzesi it is smeared on warts to make them disappear.[35] There, too, they continue to put it on the stings made by bees and wasps.[36] I find it also in use in Italian folkmedicine for ulcerous fissures in the skin (*le ragadi*),[37] for styes,[38] and for a prick made by a needle.[39] Moreover, among emetics we find mentioned both the wax from a human ear and infusions of fingernails and toenails.[39*] Either vomitive ought to bring an almost immediate action in any susceptible person. There are Italians also who endorse the use of wax taken from the ear of a dog as a cure for quartan fever.[40] Fever and dog are common enough in some parts of Italy to have given this treatment ample testing over the years.

That other offensive physical product which I paired with wax, perspiration, has a long record in popular pharmacology.[41] We recall how the Greeks and Romans used to anoint their bodies every day if they could afford the unguents. After finishing athletic exercise they would remove the combination of perfumed olive oil and sweat, not to mention other possible accretions such as dirt and dust, by means of a strigil or fleshscraper. The famous statue of the Apoxyomenos pictures the process perfectly. Wrestlers employed a special wax ointment, *ceroma*, which brought into the scrapings another ingredient. Such composites were valued medically along with the scrapings from the walls of the gymnasia as calorifics, resol-

[26] Cf., e.g., S. Salomone-Marino, "Rimedje formole contro le jettatura," *Archivio*, I (1882), 132–134; G. Pitrè, *Medicina popolare siciliana* (henceforth abbr. *Medicina*), 89.

[27] M. L. Wagner, "Il malocchio e credenze affini in Sardegna," *Lares*, II (1913), 133.

[28] G. Pitrè, *Medicina*, 90; cf. S. Salomone-Marino, *op. cit.*, 132.

[29] J. B. Andrews, "Quelques croyances et usages napolitains," *Archivio*, XVIII (1899), 42.

[29*] J. B. Andrews, *op. cit.*, 41.

[30] Zanetti, 218.

[31] Zanetti, 175.

[32] A. De Nino, *Usi e costumi abruzzesi*, V, 144.

[33] *N. H.* 28. 40.

[34] *N. H.* 30. 93.

[35] A. De Nino, *Usi e costumi abruzzesi*, I, 179.

[36] A. De Nino, *op. cit.*, V. 95.

[37] Zanetti, 195.

[38] G. Pitrè, *Medicina*, 279.

[39] G. Pitrè, *Medicina*, 295.

[39*] Zanetti, 49.

[40] Zanetti, 75.

[41] Cf., e.g., *N. H.* 28. 31.

vents, emollients, maturants, and expletives. Among the ailments for which they were deemed helpful are suppurations, swellings, ulcers, excoriations and burns, painful sinews, dislocations, and swollen joints. They were also used as an emmenagogue and as an ointment for various uterine and anal troubles.[42] A substance coming from the pores of countless men of brawn was bound to do something for the feeble.

Before we discuss more dreadful medicaments, we may remark that that ancient use of wall-scrapings has an uncomfortably close parallel among the people of the Abruzzi. On the night of Good Friday the walls of chapels are cleansed of dust which is later administered in the drink of invalids in small doses every day until something happens. If they effect a cure, the unused part of the remedy is put in a tiny bag and hung in a sacred shrine as an ex-voto.[43] My reader may, of course, object that this agency belongs to religion and not to either medicine or magic. Let Apollo decide, Apollo and perhaps Hecate, the patroness of magic-working.

URINE

When we come now to the use of urine, a student of ancient medicine, not to say of modern folklore, might imagine that he was dealing with a veritable panacea or elixir of life as he reads the eulogies of it. Both man and beast have been the ever-handy sources of supply. In Pliny's account of ancient materia medica there is an entire chapter devoted to the supposed virtues of the liquid. By itself or united with various other curatives, it is favored for all sorts of troubles of the eye and ear.[44] We may well fancy that oculists and aurists of repute were often needed to cure these cures.

By the perversity of the occult it was the urine of a eunuch that was expected to improve the fecundity of women. That which was to be used as a lotion for gouty feet had to be passed by a male. On the other hand, if a "spitting asp" shot its venom into your eye, it was the urine of a lad under the age of puberty that was required to wash out the blinding stuff.[45] It is easy to picture to the eye of fancy the eagerness of little Julius to officiate in this and other similar emergencies. Fortunately, however, it was, as a general rule, the patient's own product that was deemed the best for his malady.[46] In the use of that there was no danger from delay and small chance for imposition in any sense of the word.

There are prescriptions in our Latin writers for the use of urine, derived from one animal or another, as a liniment for burns of fire or of the sun, as also for chaps, corns and warts.[47] It was an ingredient of lotions for the skin-eruptions of a baby and for other cutaneous troubles (e.g., scurf and itch).[48] That of a bull was said to check running ulcers.[49] Steam from urine might serve as an emmenagogue.[50] Drinking that of a wild boar in small doses was held to be beneficial in dropsy.[51] The same lessened, we are told, the tortures caused by a calculus.[52] Mixed with vinegar and honey, it was taken as a potion by an epileptic.[53] If that did not help him, there was still the stale of a horse upon which to depend.[54] Urine was advised in the cure of diseases of the rectum.[55] Even the bite of a mad dog or that of a serpent and the wounds made by a scorpion or by the quill of a hedgehog called for an application of it.[56] A combination of both urine and ashes from burnt ordure was one of the bizarre creations of the *magi*. A man in a fever would have it smeared on his toes if he could believe in its utility.[57] In spite, however, of the attribution of so many virtues to urine, Celsus recognized drinking one's own as a method of committing suicide.[58]

Is it the sensational filthiness of such remedies or merely the sanctity of a long tradition that gains credit for the same sort in modern times not only for specific diseases but as a veritable cure-all? We have to confine our attention, as

[42] Cels. 5. 11; 5. 15; *N. H.* 15. 19; 28. 50–52.

[43] E. Canziani, *Through the Apennines and the Lands of the Abruzzi*, 300; cf. G. Bellucci, *Il feticismo primitivo in Italia, e le sue forme di adattamento*, 60 and fig. 37a.

[44] *N. H.* 28. 65–66; 28. 75.

[45] Cf. Cels 5. 22. 4; *N. H.* 28. 65.

[46] Cf. *N. H.* 28.67.

[47] *N. H.* 30. 80–81.

[48] *N. H.* 28. 91; 28. 163; 28. 244.

[49] *N. H.* 28. 164; cf. 28. 66.

[50] *N. H.* 28. 66.

[51] *N. H.* 28. 232.

[52] *N. H.* 28. 212.

[53] *N. H.* 28.224.

[54] *N. H.* 28. 226.

[55] *N. H.* 28. 66.

[56] *N. H.* 28. 66–67; that of a tortoise: *N. H.* 32. 34; cf. Varro's prescription for the bite of an asp, a drink of the victim's own product: *N. H.* 29. 65.

[57] *N. H.* 28. 229.

[58] Cels. 3. 21. 3.

always in this paper, to Italy. Serafino Guastella reports from there the great faith that the water which came from a certain humble Franciscan, Fra Pasquale da Casoria, commanded as a medicament for all kinds of ailments.[69] We can imagine that his celibacy was a factor in its potency when we recall that ancient belief which I have mentioned about a fertilizing eunuch. According to some local opinion in Ortona a Mare a sufferer from a diseased spleen should find his cure in a lotion which his bladder provided every morning, accompanied by a potion from it to make doubly sure.[60] In a case where a calculus has caused a retention of urine the man with the stoppage should drink that of a goat or an ass—an age-old mystic sort of remedy, as we have seen.[61] Among Sicilians brought to the point that they are ready to try anything a fever patient may get a bath in urine. In the case of an obstinate quartan, that of a pregnant woman has the preference. The patient himself probably does not care.[62] The excretion is a common prescription of folkmedicine for various ailments of the eye.[63] Conjunctivitis requires that of a male child under three.[64] His sex vouches for its strength, his age for its purity. A nursing mother ought to keep her eyes in fine condition by merely using her own infant's product as the eyewash.[65] As a potion, urine is one of the folkprescriptions for pneumonia in the region of Bari.[66] For the white ulcers of quinsy one may be counselled to use a gargle of the fluid, warm.[67] In mild cases of rupture it enjoys repute as a lotion.[68] Gout gets the same old remedy in sufficiently backward Sicilian circles.[69] Then we are informed that for not fewer than seven days in succession a person who has jaundice should drink his own water. As so often in the superstitious cures for this malady, it is the conformity in color between eyes and liquid that proves the worth of the latter.[70] A girl suffering from chlorosis may get the same prescription and probably for much the same reason.[71] But there is a more agreeable bit of occultism to use on the "royal disease." Boil an egg in the urine of the yellowed man, then feed the egg to a dog. The animal thereby takes over the disease and so relieves the patient.[72] I have gathered many instances of such transfers in medicine, but they merit a separate treatise.

The Italian goes the Roman one better—or isn't it one worse?—when he advises the urine of a goat to be drunk hot to relieve suppression of the menses.[73] Few animals rank higher than the goat in the annals of superstitious medicine: it is, indeed, an animal of power. But it is not quite clear why its urine should be administered for stomachic ills, unless, mayhap, it would act as a sure-fire vomitive upon any person of refinement.[74] In any case, anybody who has been upset by eating mushrooms in the province of Lucania (formerly Basilicata) may be advised to clear his stomach by a drink of his own. An alternative emetic, more agreeable, but possibly less effective, is olive oil taken in quantity.[76]

After some special study which I once made of the ancient treatment of dropsy, I came to the conclusion that I would rather resort to the doctor of those days with almost any other malady, if I had to follow his directions. For such a watery disease urine still seems to some to be a commendable medicine. It may come from the bladder of a sheep or goat.[76] The use of cowdung united with vegetable ingredients to form a plaster for the oedema may seem less repulsive than to drink the urine of a male infant with the blood of a pheasant. If a jaundiced woman has a mother still living, she can be cured, some Italians say, by being made to drink without knowing that it has been put in her wine or coffee some that her mother has passed. There are those, indeed, who deem

[69] S. A. Guastella, *Canti popolari del circondario di Modica*, LXXII–LXXIII.

[60] A. De Nino, *Usi e costumi abruzzesi*, V, 189.

[61] Zanetti, 238.

[62] G. Pitrè, *Medicina*, 326.

[63] A. De Nino, *Usi e costumi abruzzesi*, V. 143; Zanetti, 177; G. Pitrè, *Medicina*, 273.

[64] Zanetti, 173.

[65] M. Pasquarelli, "Medicina popolare basilicatese", *Archivio*, XV (1896), 496.

[66] A. Karusio, "Pregiudizi popolari putignanesi," *Archivio per l'antropologia e la etnologia*, XVII (1887), 315.

[67] Zanetti, 184.

[68] M. Pasquarelli, *op. cit.* (see note 65) 494.

[69] G. Pitrè, *Medicina*, 270.

[70] A. De Nino, *op. cit.* (see note 63), V, 159; cf. Zanetti, 68.

[71] Zanetti, 89.

[72] Zanetti, 64, note 4.

[73] Zanetti, 98.

[74] G. Pinoli, "Medicina popolare nel canavese," *Archivio*, IV (1885), 82; cf. G. Finamore, *Tradizioni popolari abruzzesi*, 78.

[76] M. Pasquarelli, *op. cit.* (see note 65), 502.

[76] Zanetti, 60.

this to be quite infallible.[77] Perhaps even more offensive is a wolf's liver reduced to powder and taken in urine, or powder from a dried toad.[78] *Sed de gustibus non est disputandum:* I shall not argue any question of taste in this connection.

Almost everything has been tried on epileptics in Italy since the time when great Caesar suffered from his *petit mal.* Nowadays a *contadino* may have to submit to the instillation of the urine of cattle in his ear to abort his fits.[79] Among women of a certain class, dwelling around Perugia, whose efforts to be beautiful no normal fastidiousness of the sex can hamper, the urine of a baby serves as a face wash, and there is no hurry to change a baby's diapers because of their belief that his combined excretions will make him grow up plump, and insure his possession of a soft, white skin.[80] Clearly, therefore, certain precepts of ancient dermatology are still commanding respect. The sufferer from ringworm or scab follows a long rustic tradition when he washes his head with the urine of a fasting sheep or with that of a man or cow.[81] One's own is deemed by some to be a good remedy for scurf.[82] Remembering that two thousand years ago this excretion was thought to be a sovereign curative for scabies, we learn with interest that a modern remedy recommended for that trouble is to go naked on the morning of St. John's Day to a field of oats and roll over on the oats while they are still wet with dew, but if one would avoid the indecency of such nudism, a different treatment is available. The itchy person may wash in his own urine or apply that of an ass—mayhap a felicitous choice of animal!—a lotion that is still recommended as remedial of any sort of cutaneous affection.[83] Now, while I cannot find the dew cure in our Latin authors, there is sufficient precedent to be discovered there for the nasty way. Of old the person afflicted was bidden use the marrow of an ass as a sort of salve, or, as an alternative, its urine applied in the mud that it forms on the ground.[84] The cure for chilblains should be equally easy by the sufferer's own water.[85] Why pay a doctor? Among affections of the skin erysipelas may be rubbed with this excretion if there is no lizard handy to behead for the use of its blood in the same manner.[86] For washing long hair the stale of a cow, used warm, has Abruzzese commendation.[87] When a man of Catania burns himself, he may still find that urine is the remedy that his compassionate friends advise.[88]

In the region of Perugia the workman who wounds himself in the handling of a tool may be enough of an old Roman to urinate on his injury. At least the liquid does not hurt as much as even a few drops of iodine would do.[89] Wounds are washed with urine.[90] If an Italian is injured by snake, tarantula, or scorpion, his own water may be his first recourse, as it has been through aeons of time.[91] In Sicily either gunpowder or urine may be chosen to go on a bite.[92] The choice may depend upon the degree of publicity involved, although in too many parts of that island publicity would not be too much of a deterrent.

No urologist can fail to be impressed by the parallels which I have been establishing here, nor avoid the conclusion that much of this unseemly doctoring has come down to the Italians in unbroken oral and written tradition from their Roman forbears. Before, however, we condemn it to scorn and ridicule, as being so much sheer superstition and unashamed quackery, quite unjustifiable in any possible experience, we had better examine specifically some of these proposals in the light of modern pharmacology, test them, for example, in connection with the fact that urea, the chief solid constituent of the urine of man and other animals, has been recognized scientifically as an active diuretic and put to local use to remove necrotic tissue.

ORDURE

Dropping a degree lower in the scale of repulsive medicaments, we come to the ancient and modern use of ordure in Italy. Only an expert in scatology, a study for which I disclaim having any inclination or aptitude, would care to list all the references or dwell at length upon the imbecilities

[77] Zanetti, 59.
[78] Zanetti, 60.
[79] Zanetti, 85.
[80] Z. Zanetti, *Nonne e bambini, saggio di credenze popolari umbre*, 16; Zanetti, 139.
[81] Zanetti, 229; G. Pitrè, *Medicina*, 240.
[82] G. Pitrè, *Medicina*, 241.
[83] Zanetti, 228.
[84] *N. H.* 28. 244.
[85] G. Pitrè, *Medicina*, 255.
[86] G. Pitrè, *op. cit.*, 246.
[87] G. Finamore, *Tradizioni popolari abruzzesi*, 126.
[88] A. Trombatore, *Folklore catanese*, 100.
[89] Zanetti, 191.
[90] G. Pitrè, *Medicina*, 308.
[91] Zanetti, 216; 218.
[92] G. Pitrè, *Medicina*, 298.

of those who have put their trust in such a loathsome agent. Few of our common animals could have failed to earn man's gratitude for benefits and cures if their products ever accomplished even half of what those who pretended to medical knowledge in ancient Rome claimed for them. Among the benefactors were not only animals that were commonly found on a farm or in its buildings, horse, ass, cattle, sheep, swine, goat, hare, cat, mouse, poultry, and pigeons, but also such creatures as the wild boar, badger, lizard, cuckoo, and swallow, and—to go far afield—the hyaena, crocodile, and camel. Even the excrement of a baby was credited with power to cure sterility in women when used topically.[93]

References to stings and bites are so numerous in our Latin authors that we might imagine that even city folks were much exposed to them. On a farm remedies were certainly quickly available. There one would find the dung of a goat to put on his snakebite,[94] a choice among the leavings of horse, she-goat, or poultry for the sting of a scorpion,[95] sheep manure for the poison of a spider[96] and that of badger, cuckoo, or swallow to boil in a potion to take if bitten by a mad dog.[97] Probably neither bird nor badger could save you, but it was a mental satisfaction to have done your rustic best. If you were afflicted with sores, abscesses, carbuncles, or ulcers (even carcinomata), you had the faecal services of cat, pig, goat, sheep, and pigeon.[98] Celsus, indeed, reckons various excrements as cleansers, epispastics, and caustics of value.[99]

On some theory of homoeopathic magic, we may suppose, a man might get the dung of a hyaena dried and put in his drink to cure his dysentery.[100] In spite, however, of the amazing value which the *magi* set upon this beast in occult medicine we must not picture it as one of the domestic animals, much less a family pet. It was in the amphitheatre that the Roman might see it and secure the countless remedies that were supposed to come from it. I have listed over twenty-five parts of the animal in which a fool might put his trust. Its expectation of life would be small in the neighborhood of a believer in magic.

We find the dung of an ass, calf, or goat, burnt and moistened with vinegar into a paste, advised as a stay for hemorrhage,[101] fresh cow manure as an application for erysipelas.[102] Among excrements mentioned as remedial for diseases of the eye and dimness of sight are those of wolf, she-goat, and crocodile.[103] *Crocodilea* is also listed along with ordure for curing diseases of the skin and for removing freckles.[104] To cure his alopecy and once more enjoy having a fine head of hair a man might use ashes from burnt sheep dung in an ointment of honey and oil of henna. Mouse dung was another recommendation for this.[105] But fresh hen manure was perhaps the most potent hair restorer of all.[106] If sufficiently credulous, an ancient actress might have used an equal mixture of burnt flies and the ashes of burnt mouse dung to make her eyelashes grow.[107] Hollywood resorts to neater, briefer methods.

Various ordures are listed as curatives for sprains, dislocations, pains in the joints, and contusions; for swellings (even including those of gout) and ruptures; for foot festers, chilblains, and corns; for excoriations, burns, and cutaneous eruptions.[108] Obviously they should be in the medicine chest of every foresighted family, if ancient claims for them are acceptable. Nor should we overlook the possibilities of those nine pellets of hare's dung which taken by a young girl keep her breasts from ever becoming flabby,[109] and the mouse dung that, on the other hand, is supposed to reduce the overtumid breast.[110] Need we be surprised when we are told that peacocks recognizing how precious their droppings are for medicinal purposes, swallow them out of spite against mankind.[111]

If we turn now to recent times in Italy, we discover in the pharmacopeia of popular medicine

[93] *N. H.* 28. 52; cf. 28. 44.
[94] Cels. 5. 27. 8; *N. H.* 28. 153–154.
[95] *N. H.* 28. 154–155; 29. 91.
[96] *N. H.* 29. 88.
[97] *N. H.* 28. 156.
[98] Cels. 6. 18. 5; *N. H.* 28. 165; 28. 241; 28. 254; 29. 143; 30. 113; 30. 114; 30. 117.
[99] Cels. 5. 5. 1; 5. 8; 5. 12.
[100] *N. H.* 28. 105.
[101] *N. H.* 28. 239; 28. 251.
[102] *N. H.* 28. 233.
[103] *N. H.* 28. 108; 28. 167; 28. 170; 28. 172; 29. 123–125; 29. 127.
[104] *N. H.* 28. 109; 28. 185.
[105] *N. H.* 29. 106.
[106] *N. H.* 29. 109.
[107] *N. H.* 29. 115.
[108] *N. H.* 28. 234–235; 28. 238; 30. 70; 30. 75; 30. 76; 30. 78–80; 30. 109; 31. 21; 32. 41.
[109] *N. H.* 28. 249.
[110] *N. H.* 30. 124.
[111] *N. H.* 29. 124.

and superstition the same sort of remedies and find man and many of the same animals given as the source of supply for them.[112] For his bowel ailments the Italian rustic may resort to the use of pig's dung reduced to a powder and taken internally in wine, or he may prefer as his curative for them or for bellyache and similar ailments of a digestive origin the excrement of hare, wolf, or dog, prepared and administered in the same way.[113] Homoeopathic magic all over again!

A baby fares perhaps less badly when as a cure for worms the dung of the pig, dissolved in warm oil, is applied as an ointment to its navel.[114] The same substance prepared in vinegar makes a cataplasm for nephritic colic that his elders may be advised to put on their reins.[115] Sometimes we read of what seems almost like absent treatment that is dependent upon this beneficent animal. There is a rustic saying that a dog has seven sacks of fleas, a woman as many as seven dogs. The way to get rid of the wife's supply is simply to keep under the bed some hog manure.[116] In order to stop a hemorrhage one needs merely make a plaster from the ordure of an ass, and in Italy that is seldom far to seek.[117] For an ordinary nosebleed the droppings of a hare or pig should be dried and powdered so as to be used conveniently as a styptic snuff. Even a muriphobic woman may have cause to bless a mouse as her benefactor if it be true that its dung taken in drink will bring back her milk when she has gone dry in nursing her newborn child.[118] It is also recommended as a remedy for swollen breasts when applied in a fomentation.[119]

A sudden swelling is widely recognized to be the work of the Devil and so every *tumefazione* should be signed with the cross or with the sign of Solomon, or be branded with a candle that has been blessed. If the *demonio* has had no part in raising it, it should have applied to it a plaster of human or cow manure.[120] The Romans knew the cure probably long before there was any Christian to tell them of its Satanic origin. A highly popular method of reducing the swelling quickly is to put on it the dung of pigeons as being the most potent of all manure. In default of that the droppings of a goat, boiled in vinegar, may serve well enough.[121] An ointment made of the faeces of a wild boar is an application for hernia,[122] a man's own for a sprain or twist.[123] The Roman precedents for both are fairly close. Cat dung mixed with vinegar ought to relieve the pain in gouty feet, but it is just as well, we are told, to have one's pet dog sleep on them.[124] The quack who prescribes that assuredly never had gout! The cataplasm is recommended also for baldness.[125] A person who is afflicted with measles or erysipelas is expected to hold his face over the exhalations of a privy.[126] An alternative for the latter is to put on the inflammation a plaster of calf's manure which is also a cure for burns.[127] A folkprescription for myopia is to blow through a tube into the eyes a mixture of pulverized cuttlefish bone and human faeces that have been dried and powdered.[128] One might imagine that this would end sight, both near and far, forever.

We have reported a list of sufficiently shocking uses of excrement to make one puzzle his brains to find explanations for them. Possibly the best excuse for the ancient confidence in some that come from herbivorous animals is the idea that the animal, guided by nature, would eat simples of medicinal power, and digest them into compact form that made them useful as "shot-gun remedies." Some herb in its diet might be counted on as potent in the resulting synthetic drug which it voids. It was, indeed, for this very reason that they valued the dung of the root-eating hog[129] and that of the omnivorous she-goats.[130]

SEX PRODUCTS AND SEXUAL INTERCOURSE

The two most characteristic sex products that belong respectively to the male or the female alone were also valued in therapy, and the tales

[112] Zanetti, 13.
[113] Zanetti, 55; 58; cf. 60, note 3.
[114] Zanetti, 157.
[115] Zanetti, 239.
[116] Zanetti, 233.
[117] Zanetti, 196.
[118] G. Di Giovanni, *Usi, credenze e pregiudizi del canavese*, 74; G. Pinoli, "Medicina popolare nel canavese," *Archivio*, IV (1885), 82.
[119] Zanetti, 148.
[120] Zanetti, 202–203.
[121] Zanetti, 209; M. Pasquarelli, *op. cit.* (see note 65), 495.
[122] Zanetti, 211.
[123] A. De Nino, *Usi e costumi abruzzesi*, V, 92–93.
[124] Zanetti, 204.
[125] Zanetti, 236.
[126] G. Pinoli, *op. cit.* (see note 118), 82.
[127] Zanetti, 189.
[128] G. Pitrè, *Medicina*, 279.
[129] *N. H.* 28. 136.
[130] *N. H.* 28. 170.

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of medicine and magic that concern them occupy much space in the Natural History of Pliny the Elder, and some in the literature of Italian folk-medicine. They outrage reason no less than decency. Such tales must remain untold here. We ought, however, to mention a fact that is of considerable sociological importance in Italy today: many lowgrade Italians believe that sexual intercourse with a virgin will cure a man of either blennorrhoea or syphilis. In the course of time this belief has accounted for a pitiful number of assaults on children.[131] Ancient medical theories established antecedents enough for this superstition. The congress of the sexes was regarded as a relief or cure for various mental and physical ills such as, e.g., melancholia, hysteria, and epilepsy and, somewhat as an anticlimax, for the sting of scorpions and bite of snakes.[132] This is still thought to be one of its merits.[133]

WORMS AND INSECTS. ARACHNIDS

The mere sight of various species of worms and insects and of caterpillars and other larvae is repulsive to most sensitive people, and any idea of using such creatures medicinally would be to them utterly revolting. There is, however, ample evidence in Latin literature that some of the most offensive among them were employed in that way some two millennia ago.

Earthworms were pounded into a mash to make a healing poultice. Perhaps the ancients had an idea that Mother Earth gave special curative virtues to creatures that lived lives that were so dependent upon her bounty. The worms were preserved in honey to be used in compounding various medicinal agents whenever a need for them should arise,[134] as, for example, when one had been stung by a scorpion.[135] Sometimes they were burnt so as to provide ashes for the healing of ulcers, abcesses, places where there were splintered bones, etc.[136] In vinegar they were an application for erysipelas and wounds.[137] When worms were prescribed for jaundice, myrrh was added to the vinegar-mead in which they were put, in order to make the dose slightly less offensive to swallow.[138] Boiled earthworms were an ingredient of an injection used for desperate maladies of the ears.[139] They must, indeed, have killed the last hope of recovery. When we read that a certain small worm was put in the hollow of an aching tooth, we wonder whether it was one that worked as maggots do when the modern doctor puts them in a wound.[140] Earthworms in one state or another are required by a number of dental prescriptions.[141] In wine they were among the ancient lithontriptics.[142] The use of such abominations may not seem so strange after we learn that Roman epicures could look upon certain larvae that were found under the bark of trees as great delicacies for the table.[143]

One of the remedies offered for jaundice was a milleped to be taken in a half pint of wine, and these many-footed creatures, after special treatment, were recommended for the alleviation or cure of lumbago, asthma, consumption, scrofula, swellings, gout, quinsy, urinary troubles, earache and various sores.[144] Even worse, they appear in combination with pigeon manure and raisin wine as a gargle,[145] and certain worms, if administered to the number of five or seven, were said to promote conception. The mystic numbers perhaps did the business.[146] Who knows?

We have ancient references to venomous insects, the *cantharis* and *buprestis*, which have led scholars to identify one or both of them with our cantharides, or Spanish flies, but our informants were none too helpful to the entomologist in the data that they give.[147] We learn that the bites of these beetles, or an accidental swallowing of them caused

[131] R. Corso, *Reviviscenze, studi di tradizioni popolari italiane*, 7; M. Pasquarelli, *op. cit.* (see note 65) XVI (1897), 52; J. B. Andrews, "Quelques croyances et usages napoletains," *Archivio*, XVIII (1899), 43; Zanetti, 242; G. Pitrè, *Medicina*, 463.

[132] Cels. 2. 1. 20; *N. H.* 28. 44; 28. 58; 28. 83; Mart. 11. 71. 1–2.

[133] Cf., e.g., G. Pitrè, *Medicina*, 275.

[134] *N. H.* 30. 115.

[135] *N. H.* 29. 92.

[136] *N. H.* 30. 79; 30. 119; 30. 125; cf. 30. 134: on hair.

[137] *N. H.* 30. 106; 30. 116.

[138] *N. H.* 30. 93.

[139] *N. H.* 29. 135; cf. Cels. 6. 7. 1 D.

[140] *N. H.* 30. 24.

[141] *N. H.* 30. 23.

[142] *N. H.* 30. 66.

[143] *N. H.* 17. 220.

[144] *N. H.* 29. 136; 29. 143; 30. 34; 30. 40; 30. 47; 30. 54; 30. 68; 30. 75–76; 30. 86; 30. 93; 30. 114. It is possible that, in some cases, at any rate, *millepeda* means "wood-louse."

[145] *N. H.* 30. 32.

[146] *N. H.* 30. 125.

[147] *N. H.* 11. 118; 23. 29; 28. 74.

serious trouble in the case of both man and beast,[148] but none the less, they were used medically as a caustic,[149] a cleanser of wounds,[150] a diuretic and emmenagogue,[151] a remedy in the treatment of lichens and leprosy,[152] a curative of their own bites,[153] and in many other ways.[154] The buprestis is described as a powerful aphrodisiac.[154*] Swallowing it, they said, would cause an ox to swell and burst from inflammation. Among the antidotes and remedies for internal poisoning by cantharides[155] and for the bites of this insect were milk (including that of a woman) and must.[156] I need not dwell upon the parallels for the use of cantharides in modern countries, both illegitimately in philtres and legitimately as rubifacients and vesicants, but pass to another group of insects.

The greasy inwards of certain kinds of beetles or cockroaches suggested their use in preparations of salve for the ear.[157] As a matter of fact, beetles appear to have had a surprising importance in the materia medica of antiquity.[158]

Bugs played a role in antidotes for poisons and for venomous bites,[159] in applications for itch,[160] in eye-ointments and injections for the ears,[161] and, according to one interpretation of the text, they were actually introduced into the urethra in the treatment of stranguary.[162] Let us hope that the doses were within homoeopathic proportions. Pliny disapproves the use of them in cases of quartan fever as being futile and also in cases of vomiting.[163] Of the latter certainly they might seem more likely to be the cause than a cure. More reasonable, he opines, was their employment in the treatment of lethargy, seven being put into a cyathus of water, if the person to drink it was an adult, but only four, if a child.[164] Why the presence of more than one would be needed to arouse the most apathetic patient of any age is not easy to understand.

Epilepsy figured as one of the most dreaded diseases: in the case of a hardy person a remedial drink for it had to contain twenty-one red flies, gathered dead, if it was to be effective.[165] For less robust patients the number could be reduced. A mash of flies, or the ashes from burning them, or the heads or blood of the insects were ingredients of hair restorers. We may wonder whether the inventor of these recipes may not have been some vindictive baldhead who had often failed to swat them. We have other prescriptions calling for the use of flies.[166] Locusts also were remedies.[167] Some advocated the use of the blood of a tick or of mashed crickets in combatting erysipelas.[168] That so-called blood appears also among depilatories.[169]

There were arachnidan remedies. Compresses applied to the forehead and temples of a person who was suffering from a tertian fever might contain a wolf spider and its web.[170] Spiders rotted in oil were thought to be an antidote for their own bite.[171] No less superstitious are various uses of this insect to better the special functions of women.[172] The Roman barber staunched the flow of blood from cuts that his razor made by putting cobwebs on them.[173] To judge by the razors that have come down to us, spiders must have done a lot of such doctoring. Webs woven by certain species and the insects themselves, mashed in old oil, were recommended for the cure of eye troubles.[174] Roman ears also did not escape arachnidan remedies.[175] Doctors might make a fricative from the bodies of spiders as a cure of condylomata.[176] As a bit of magic one might be put on a boil.[177]

[148] *N. H.* 22. 78; 28. 155; 29. 96; 30. 39–30.
[149] Cels. 5. 8. 1; *N. H.* 29. 95; 30. 70; 30. 81.
[150] Cels. 5. 22. 2 C; *N. H.* 30. 122.
[151] *N. H.* 29. 95.
[152] Cels. 5. 28. 18 B; *N. H.* 29. 93; 29. 95; 30. 30.
[153] *N. H.* 29. 94.
[154] Cf. *N. H.* 30. 111; 30. 120.
[154*] *N. H.* 22. 78.
[155] *N. H.* 29. 93–94; 29. 96.
[156] Cels. 5. 27. 12; *N. H.* 23. 29; 28. 74; 28. 128.
[157] *N. H.* 29. 139.
[158] *N. H.* 29. 140–142.
[159] *N. H.* 29. 61; 32. 33.
[160] *N. H.* 30. 131.
[161] *N. H.* 29. 62.
[162] *N. H.* 29. 64.
[163] *N. H.* 29. 63.
[164] *N. H.* 30. 92.
[165] *N. H.* 29. 106.
[166] *N. H.* 30. 108; 30. 121; 30. 134.
[167] *N. H.* 29. 92; 30. 30; 30. 111; 30. 117; 30. 123; 30. 129.
[168] *N. H.* 30. 106; cf. 28. 256.
[169] *N. H.* 30. 134.
[170] *N. H.* 30. 104.
[171] *N. H.* 29. 88.
[172] *N. H.* 30. 129; 30. 131.
[173] Cels. 5. 2. 1; Petron. 98; *N. H.* 29. 114.
[174] *N. H.* 29. 131–132.
[175] *N. H.* 29. 138.
[176] *N. H.* 30. 70.
[177] *N. H.* 30. 108.

Prepared in one way or another, the scorpion used to be put into various medicaments for internal as well as external use.[178] Two thousand years ago the vicious pest was employed to cure its own sting. The victim of it might pound up or burn his enemy and then take it in his wine,[179] or he might mash it into a poultice for the wound, or merely roast it on a brazier so that, as it burned, it fumigated the punctures. No doubt a vindictive pleasure might contribute to the psychology of this cure.[180]

Modern medical uses of formic acid may make us patient with the bears and human beings who took ants as a medicine in antiquity,[181] whatever the former may do today.

The pharmaceutical use of worms and insects still persists in Italy, especially among ignorant yokels who have more confidence in the worst gifts of Nature than in the most refined synthetics of chemistry. We may list in the rustic pharmacopeia oils made to carry the properties of earthworms, caterpillars, and scorpions.[182] A thick broth made with worms may be taken by a nursing mother in order to increase her supply of milk.[183] A sip every morning from a bottle of oil in which earthworms have been put is a possible substitute for using it merely as an ointment for the cure of piles.[184]

Where superstition still flourishes in Italy victims of fevers may be fed bugs in various mystical numbers, e.g., seven or nine, taken in a fresh egg or a bread pill.[185] One of the ways in which the ancient doctored the puncture made by a scorpion anticipated closely enough the Sicilian method of applying olive oil which contains two or three of the insects that have been decapitated in it.[186] As a matter of fact scorpion oil is a recognized remedy in folkmedicine for cuts and poisoning.[187]

The milleped also is still used, but it is now for an aching tooth and not an aching ear. A poultice made from them is applied "*come calmante.*"[188] A weevil that lives on the cnicus may be used as a fricative on the bad tooth.[189] Centipedes roasted alive, reduced to a powder, and mixed with olive oil, serve as an ointment to rub on hemorrhoids.[190]

When the pains of rheumatism are not sufficiently relieved by the use of fat derived from the cadavers of a dissecting-room, there is still available as an internal medicine a dose of sheep lice. Nine is the number prescribed. Of course, weaklings may prefer to continue their trust in the dried-up potato which they have been carrying on their person during many a year of sporadic comfort.[191]

To combat jaundice one should put three lice in an egg, barely warmed, or in milk, and administer it as a matutinal dose.[192] Sometimes without knowing it, the patient may receive fifteen bed bugs in carefully distributed doses.[193] There are heroic Italians who will knowingly swallow seven of them in a spoonful of water in the hope of a cure.[194] An alternative is one louse daily for five successive days, put in the patient's pottage soup, *minestra*, or in the herbs that he eats, these being highly seasoned in the cooking for an obvious reason.[195] In Liguria it is twelve lice that they give in a fresh egg, if local superstition commands sufficient confidence.[196]

A spider's bite is to be cured by putting on the wound the insect that caused it.[197] In some parts of Italy, at any rate, country people still make remedies of spiders and their webs to relieve fevers. Cobwebs are said to contain an acid that acts as an antipyretic.[198] The latter are still employed as

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[178] Cels. 5. 27. 5; *N. H.* 11. 90.

[179] *N. H.* 11. 90.

[180] Cels. 5. 27. 5.

[181] *N. H.* 8. 101; 29. 133; 30. 29; cf. 30. 134.

[182] Zanetti, 13; 85; 186; 240; G. Pitrè, *Medicina*, 298.

[183] Z. Zanetti, *Nonne e bambini*, 13.

[184] G. Pitrè, *Medicina*, 404.

[185] M. Pasquarelli, *op. cit.*, (see note 65), 500; A. De Nino, *Usi e costumi abruzzesi*, V, 14; G. Pitrè, *Medicina*, 325; 414.

[186] S. Raccuglia, "Medicina popolare siciliana," *Rivista delle tradizioni popolari italiane*, I (1893–1894), 727; G. Pitrè, *Medicina*, 298.

[187] G. Di Giovanni, *op. cit.* (see note 118), 75; G. Pinoli, *op. cit.* (see note 74), 83; Zanetti, 192; A. Nardo-Cibele, *Zoologia popolare veneta, specialmente bellunese*, 135.

[188] A. Mancarella, "Superstizioni popolari pugliesi," *Il folklore italiano*, V (1930), 140.

[189] G. Pitrè, *Medicina*, 337.

[190] C. Coronedi-Berti, "Appunti di medicina popolare bolognese," *Rivista di lettatura popolare*, I (1877), 9–10.

[191] Zanetti, 207.

[192] Zanetti, 63.

[193] A. De Nino, *op. cit.* (see note 185), V, 159.

[194] A. De Nino, *op. cit.*, V, 159–160.

[195] Zanetti, 63.

[196] Zanetti, 63, note 1.

[197] G. Pitrè, *Medicina*, 201; 299.

[198] Zanetti, 69 and note 1; A. De Nino, *op. cit.* (see note 185), V, 12; M. Pasquarelli, *op. cit.* (see note 65), 500.

a styptic,[199] and, also, for some reason, or lack of reason, put under the armpits of a fever patient.[200] Something can perhaps be said for the use of insects of galls put in oil as an ointment for wounds, since many of the excrescences contain tannic acid.[201]

The various creatures that we have been reviewing have sometimes performed much less repulsive service of a magical rather than a medicinal nature. A remedy widely accepted in some parts of Italy for an obstinate fever which has perfect precedent[202] is to suspend from the sufferer's neck a small purse or box containing a hairy caterpillar. Being provided with no food, it dies and dries up. This is taken to indicate that the disease has abandoned its victim.[203] As large a caterpillar as possible is selected, or one of the species Pavonia major or Pavonia minor, one with a "horn" upon its head, in the case of a man, one without one, in the case of a woman. Sometimes a little bran is put into the receptacle along with the caterpillar in order to keep it alive for forty days. It seems obvious that this provision would give the remedy a better chance of success as an operation of sympathetic magic.

We must leave undecided whether the woman of Perugia who makes a paste out of a worm that has come from her baby and gives it to him in his food or drink to rid him of the rest of his worms would consider her vermifuge to be medical or would not frankly admit that it was magical.[204]

CONCLUSION

At this late date and with only the scant data left us available nobody possessed of a scholar's caution will conjecture to what extent the remedies that I have selected for illustration from my Latin sources, whether they belong to native oral tradition or to the literature of learning that reported Greek and Oriental inventions, were actually employed by the ailing Roman. Moreover, nobody has ever investigated the folkmedicine of modern Italy sufficiently to chart the range in use of these remedies among the intellectually submerged of today.

Among ancient medicaments of animal origin there are so many that strike one as quite remote from any scientific justification that it would have been easy to constitute other special groups for our study. But none that I might select could raise more forcefully certain questions that stimulate conjecture. First of all, the extremely outrageous character of most of those that belong to my categories and of many other animal remedies make us wonder whether they were not intended to capture a morbid and superstitious imagination and even, in some cases, to achieve a psychic shock that was supposed to be salutary.

There were unquestionably some diseases in which the ancient physician sought to administer a shock, and the agents he used were quite as repulsive in some instances as those that we have surveyed. Lethargy, as it was understood by the diagnosticians of those times, is one of those diseases. The man who had fallen into a lethargic state might have a variety of startling things done to him to bring him back to full activity of mind and body. They gave him sternutatories to convulse him with a sneeze. They made him smell all sorts of stimulative odors, e.g., those of mustard, garlic, onion, hellebore, the juice of hog's fennel (sulphurwort), unscoured wool, the rennet of a seal or whale, the dried testicles of a weasel, the callosities from an ass's legs steeped in vinegar, or just vinegar alone, the liver of a wild boar, and castoreum.[205] Another excitant used was the stench of the gastropod of a strombus or conchshell after it had been allowed to putrefy sufficiently in vinegar.[206] They set on fire near him, pitch, the fetid gum resin galbanum, or such things as the hair or horns of a goat, the liver of a weasel, castoreum from the anal sacs of a beaver,[207] or they doused him suddenly with jarfuls of cold water. Such maltreatment might bring to full consciousness even desperate cases. It could certainly be characterized as a resort to shock remedies, and we can well understand how a man coming out of

[199] A. De Nino, *op. cit.* (see note 185), V, 97; G. Pitrè *Medicina*, 307; G. Finamore, *Tradizioni popolari abruzzesi*, 142; A. Trombatore, *Folklore catanese*, 98; M. Pasquarelli, *op. cit.* (see note 65), 499; soaked in oil: G. Di Giovanni, *op. cit.* (see note 118), 75

[200] G. Pitrè, *Medicina*, 326.

[201] E. Canziani, "Abruzzese Folklore," *Folklore*, XXXIX (1928), 234.

[202] *N. H.* 30, 101; cf. for other amuletic uses of such things *N. H.* 29. 64: bugs.

[203] Zanetti, 72; 250. Jaundice is said to be curable in similar fashion by using a silkworm: G. Pitrè, *Medicina*, 356.

[204] Zanetti, 156.

[205] Cels. 3. 20. 1-2; 3. 20. 4; *N. H.* 26. 118; 28. 230; 30. 97; 32. 116.

[206] *N. H.* 32. 117.

[207] Cels. 3. 20. 1-2; 3. 20. 4; *N. H.* 28. 230; 30. 97; 32. 28.

his lethargy might, as Horace suggests, turn pugilist and assail his doctor.[208]

But there are some curatives that call for a different interpretation. I suspect, for example, that smearing the lethargic person with the blood of a tortoise was for the occult reason that the tortoise is itself a somewhat inert creature.[209] Again, when a lethargic person got a dose of bugs in water it was not, I suspect, in order to outrage his sensibilities, but because bugs were believed to neutralize the soporific effects of an asp's venom.[210]

The appearance of a person who had been laid prostrate by an attack of epilepsy sufficiently resembled a state of lethargy to make it reasonable in the loose thinking of ancient medicine to use somewhat the same treatment on the victim.[211] Castoreum, or the afterbirth of a she-ass might be held beneath his nose to abort the seizure.[212] Burning horn was a diagnostic test.[213] On the other hand, the ancient medicinal treatment of epilepsy requires a different interpretation. I do not believe that it was for the purpose of shocking an epileptic that he got a dose of horse's stale,[213] the excrescences from a horse's leg taken in honied vinegar,[213] lights of a hare salted and administered in white wine for thirty successive days,[214] and ass's hoofs reduced to ashes and taken in daily doses of two spoonfuls for the same length of time.[215] Belief in the occult powers that every magician recognized in the organs of reproduction will account for such prescriptions for epilepsy as eating castoreum, or the testes of a bear, or taking in mare's milk those of a wild boar, or in sow's those of swine, or in ass's those of an ass.[216] Quite magical, of course, is that Greek cure that required an epileptic to eat the flesh of a wild beast which has been killed with an iron weapon that has slain a man.[217] In the same category belongs the prescription of Artemon that the victim of epilepsy should drink water from the skull of a man who has been killed.[218]

[208] Hor. *Sat.* 2. 3. 30.
[209] *N. H.* 32. 116.
[210] *N. H.* 29. 63.
[211] Cels. 3. 23. 2; 3. 23. 6; cf. *N. H.* 8. 116; 32.37.
[212] *N. H.* 28. 225; 32. 112.
[213] *N. H.* 28. 226.
[214] *N. H.* 28. 224.
[215] *N. H.* 28. 225.
[216] *N. H.* 28. 224-225; 32. 112. The Romans mistook the sacs of the beaver for testicular glands.
[217] *N. H.* 28. 34.
[218] *N. H.* 28. 7.

There is one remedy for the disease, the most famous or infamous of all that classical antiquity reports, that some conjecture to have been intended to administer a curative shock. The epileptic was advised to drink the blood of a gladiator while it was still warm from his wounds like the wild beast in the arena which had overcome him in a contest,[219] a practice of which the early Christians spoke with a peculiar horror. But that does not seem to me to have been the purpose of the remedy. The person who has been stricken by a fit lies like one about to die. The dying wild-beast fighter, often a man of superior health and might, dispensed his life stream to vitalize the epileptic who quaffed it. Certain Greeks averred that merely anointing with blood the mouth of the prostrate man would set him on his feet again.[220] As a matter of fact Celsus expressly urges that an epileptic should be safeguarded against terrifying sights,[221] and the Roman amphitheatre would be no place for him to go as a mere spectator.

In analyzing the ancient treatment of hysteria we are reminded again of the doctoring of lethargic patients. The woman suffering from it might have to have a fumigation from burning hair, castoreum, the fat of a seal or dolphin, or a strombus that had decayed in vinegar.[222] An alternative was to smell the extinguished wick of a lamp, or castoreum, or to receive a dousing of cold water.[223] For rectifying certain conditions a shock might seem to be obviously the correct thing to try. So we are told that the way to dislodge a fishbone caught in the throat is to plunge the swallower's feet into icy water,[224] and to arrest a fit of sneezing or of hiccups to thrust the person's hands into boiling water.[225] Similarly to stop coughing caused by phlegm we are advised to blow in the person's face.[226] In order to establish an aversion to drink they used to put nauseating things in the drinker's wine, such as fish that had been drowned or left to putrefy in it, including, be it noted, eels.[227]

In spite of the usages which I have just been

[219] Cels. 3. 23. 7; *N. H.* 28. 4.
[220] *N. H.* 28. 43; cf. 32. 36.
[221] Cels. 3. 23. 3.
[222] *N. H.* 28. 70; 32. 129-130; 32. 134.
[223] Cels. 4. 27. 1 B; *N. H.* 32. 132.
[224] *N. H.* 28. 49.
[225] *N. H.* 28. 57.
[226] *N. H.* 28. 60.
[227] *N. H.* 32. 138. The blood of an eel does the business today: G. Pitrè, *Medicina*, 352.

recording, I do not believe that, in general, the bizarre and sensational character of remedies, whether used now or two millennia ago in Italy, was responsible for their adoption. We have much evidence of the efforts that have been made in the use of such repulsive things as animal secretions and excretions to conceal from the diseased person what he is receiving or to convey it in such coverings or liquid media as will make his dosing endurable. The attempt of the doctor is quite the reverse of causing a psychological shock. Some of the worst remedies unquestionably had an occult reason behind them that classifies them among the contrivances of magic. But when we have eliminated them, what are we to conclude about the rest?

I am inclined to think that such substances as dung and urine and concoctions of revolting insects were looked upon in much the same way as other internal and external medicine and that they are so regarded among their present day users. "Sheep-tea" in the New England of some generations ago was not a shocker, but just a medicinal dose. Science condemns at once some of the disgusting prescriptions as wholly nonsensical. Even Pliny did. Yet so great is the curative power of faith, so much do Dame Nature and Father Time do for us in illness we cannot doubt that the ill often parted with at least a functional trouble concomitantly with, if not by reason of, even the most offensive treatments that I selected as most likely to pique the curiosity of a doctor. The Romans were notably a hardheaded practical people. If their actual experience led them to transmit to the twentieth century some of this dreadful therapy, it may be because Apollo with a sense of humor wished to challenge the medical profession of today.

How frequently within the last few years has some laboratory worker announced that his scientific analysis has revealed some justification for the craziest of superstitious practices! I could give numerous references to the use of liver in ancient recipes that a modern victim of anemia might read with interest. The head of the loathsome toad that went into a witch's medical brew turns out to contain a glandular substance that acts much like adrenalin. But it is my favorite Latin poet Catullus who provides the choicest morsel.[228] He tells us in the spirit of a jealous rival of a certain Egnatius who showed his snow-white teeth in smiles on all occasions. Egnatius may have enjoyed and returned too often the smiles of Catullus' Lesbia. In any case, our poet charges that the whiteness of Egnatius' teeth was due to his using as a toothwash in the morning the water that he voided in the night. Nothing could seem to be much nastier or more repulsive to a sweetheart than such a dentifrice. Yet was it not only yesterday that I heard that urea had been found useful in the treatment of pyorrhoea?

And so as an ignorant layman in terror of trespassing further upon the territory of medical experts, I leave to them the task of discovering among these age-old remedies of a shocking character something that may vindicate those who used them from my charges of folly and win for humanity a new drug. Let some Egnatius with a dentifricial smile have the last laugh.

[228] Catullus 37 and 39.

Concerning a Japanese Physician's Honorary Sword

By ELLA N. WADE

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MOST visitors to the Mütter Museum are acquainted in one way or another with such specimens as the Mütter Giant, the Petrified Lady and the H. Augustus Wilson collection of shoes of all nations, since they occupy considerable space in the Museum and papers have been written about them. There are, however, a great many exhibits equally as interesting and as prominently displayed which because of their comparative size often are overlooked by a visitor unless special attention is called to them. This is true of a unique item that reposes in case 62 of the Museum, and which to a casual observer appears to be merely a beautifully carved and polished piece of wood. It is what is known as a Japanese honorary sword and was purchased by Dr. Charles D. Hart—a Fellow of the College—in Tokyo in 1892 and presented to the Mütter Museum in 1896.

The fact that this "honorary sword" was *purchased* by Doctor Hart is in itself unusual since these highly prized emblematic weapons were rarely sold. It is as unusual to be able to buy one of these, Doctor Hart explained, as it is to purchase a Congressional Medal of Honor or any other distinguished service decoration, so it is indeed our good fortune that some chance enabled Doctor Hart to obtain this rare specimen and make it a permanent possession of the Mütter Museum.

The "sword," one will perceive, is not a sword in the strict sense of the word, but a solid piece of wood—an imitation sword. It is about eighteen inches long and two inches wide, tapering slightly at the ends, and it is about an inch in thickness. The wood resembles mahogany but is heavier than a piece of mahogany of that size would be, and consulting a cabinet-maker we learned that it is from a tree common in China and Japan, the wood of which is red in color. The "sword" is slightly bowed, beautifully rounded and highly polished. On one end is carved an oni—or Japanese devil known as Bunshosei, the flying demon emblematic of the dissemination of the written thought. He is represented with a writing box in one hand and a brush in the other and is mounted upon a fish with the head of a dragon and fins transformed into wings. On the opposite end is carved a tortoise—Monogame—one of the four animals of Chinese mythology which is emblematic of longevity. Beside the tortoise is a two-edged sword which might be the sword known as Ken, a "sword-praying-for-rain." To the left of the tortoise is a seven star Japanese constellation. On the same end but on the opposite side of the sword, a bat, Kawahari, signifying good fortune and prosperity, is carved. Beside the bat is a three star Japanese constellation. There is a small ring projecting from the concave side and some distance along a hole has been made through the wood. These were evidently used to hold the cord that fastened the sword to the belt of the wearer.

These honorary swords were privileged to be carried by physicians of Old Japan as a special honor, granted because of the high esteem in which the medical profession was held. This was indeed a mark of respect when one considers how far removed were the physicians in the elaborate feudal system that existed in Japan several hundreds of years ago, from the nobility and military classes who were the only ones allowed the honor of wearing swords, and when one also takes into consideration the powerful influence of the sword upon the life of the Japanese as a nation. Just as a certain distinction was given to the wearer, so also were honor and fame bestowed upon those who became skillful in its use. Much value was put upon a fine blade and honors heaped upon an expert sword-smith.

To fully understand this honor bestowed upon the physicians one must know something of the elaborate Japanese feudal system which had its origin in a myth. We are told that the Sun Goddess, Amaterasu o Mikami was born from the left eye of Izanagi, the male member of a pair of

deities (Izanagi and Izanami) who came out of nothingness. It was from Amaterasu that the imperial family of Japan traces its descent and to whom the Mikado in person reported important national events.

Next to the Mikado were the daimio, chief feudal barons or territorial nobles, each having full responsibility of law and order in his own domain and to whom the mass of people, principally farmers, owed allegiance and taxes. Some of these daimio, more powerful than others, acted for the Mikado under the title of Shogun. Upon the Shogun devolved a large share of the governing power, and although they acknowledged the supremacy of the Mikado, they were virtual rulers of the country. In time many of the daimio tired of the domination of the Shoguns in matters of treaties and trade relations and this eventually led to the resignation of the Shoguns and the resumption of the authority by the Mikado.

Japanese Physician's Honorary Sword, from Original in the Mütter Museum of the College of Physicians of Philadelphia

Next in order came the samurai or military caste. A samurai carried at least two swords—a long one and a short one—sheathed in scabbards of lacquered wood, thrust into his girdle and fastened in place by cords of plaited silk. The short sword was not for actual combat but was used to cut off the heads of the enemy after overthrowing him or by a defeated Japanese soldier to commit harakiri. Among all the privileges the samurai enjoyed over the common man, none was prized more highly than the right to carry a sword, which he never drew without using. It is also said that a samurai never gave his word without keeping it, but as truth does not seem to be valued as highly in Japan as it is in our own country, it seems probable from recent experiences in the present war that the average Japanese will not sacrifice expediency on the altar of truth.

The code of ethics governing the samurai was called the bushido. This outlined his conduct as to duties, recreation, dress and diet. His fundamental virtues were frugality, fealty and filial piety.

Below the samurai were the farmers, artisans, merchants, lawyers, physicians, teachers and bankers and at the bottom of the social scale were the Eta or outcasts.

By this brief survey of the old Japanese feudal system and by the realization of the almost unbelievable importance given to the sword by the Japanese people, it may be readily seen that the physicians, well down in the social scale were never-the-less highly respected and so deemed worthy of wearing a sword, although merely an imitation one.

The Mütter Museum has in its possession another imitation sword from Japan presented by Dr. Horatio C. Wood. Correspondence with a member of the Wood family has failed to elicit any more information than appears in our catalogue, but that description puts a somewhat different interpretation on this ornamental piece of Japanese handicraft. This lable reads, "Japanese curio, now rare, was assumed by the former Japanese doctor on taking his profession, and worn in his belt to show that he belonged to the sword-bearing or samurai class but by entering the medical profession, had become a non-combatant." This differs somewhat in appearance from the one given to us by Doctor Hart. It is a piece of wood cut from the center of a small tree limb, on which the bark still remains. The whole is lacquered and is ornamented with inlaid leaves and berries of ivory which have been tinted. A Japanese inscription is cut into one side, below which is inlaid a small piece of mother-of-pearl. Although the two swords differ in appearance they both may be, and probably are honorary swords. Be that as it may, they are both worth-while exhibits which the visitors to the Mütter Museum should not fail to examine.

Transactions of the Sections

SECTION ON GENERAL MEDICINE

Regular Meeting, January 24, 1944

The Heart in Infection, with Special Reference to the Electrocardiogram. William G. Leaman, jr, M.D., P. F. Lucchesi, M.D., and Bernice E. Durgin,* M.D. (Commentator: William D. Stroud, M.D.)

Pulmonary and Intestinal Changes in Strongyloidiasis. Capt. J. Edward Berk, (MC), Major Marston T. Woodruff,* (MC), and Capt. Alexander W. Frediani,* (MC). (Commentator: W. G. Sawitz,* M.D.)

Disturbances of Intracellular Electrolyte Equilibrium in Diabetic Acidosis. George M. Guest,* M.D.

Joint Meeting,[1] February 28, 1944

The Treatment of Thyrotoxicosis with Thiouracil. Karl E. Paschkis, M.D., A. Cantarow, M.D., and A. E. Rakoff, M.D. (Commentator: Adolph A. Walkling, M.D.)

The Treatment of Thyrotoxicosis with Thiouracil. Edward Rose, M.D., and Jeannette McConnell, M.D. (Commentator: John S. Lockwood, M.D.)

Safe Endocrine Therapy in General Practice. E. L. Sevringhaus,* M.D.

Joint Meeting,[2] March 27, 1944

The Pathogenesis of Rheumatoid Arthritis. Allan D. Wallis, M.D. (Commentator: John Lansbury, M.D.)

Amyloidosis Complicating Juvenile Rheumatoid Arthritis (Still's Disease), with Recovery. Abraham Trasoff, M.D., Capt. Maxwell Scarf, (MC), and Lt. Norman G. Schneeberg, (MC). (Commentator: Hobart A. Reimann, M.D.)

Report on a Case of Torula with Osseous Lesions. Paul C. Colonna, M.D., and George S. Maxwell, M.D. (Commentator: F. D. Weidman, M.D.)

Medical Management of Rheumatoid Arthritis. Bernard I. Comroe, M.D.

Joint Meeting,[3] May 22, 1944

The Effect of Testosterone and Other Steroids on the Kidney. Hans Selye,* M.D.

SECTION ON OPHTHALMOLOGY[4]

Regular Meeting, January 20, 1944

Intraocular Pressure and Transudation across Retinal Vessels. Joseph Igersheimer,* M.D. (Commentator: Francis Heed Adler, M.D.)

Regular Meeting, February 17, 1944

Marcus Gunn Phenomenon: Presentation of Two Cases. Edmund B. Spaeth, M.D., and James S. Shipman, M.D. (Commentator: Francis C. Grant, M.D.)

Precipitous Development of Optic Neuritis and Cataracts in a Case of Hypoparathyroidism. Walter I. Lillie, M.D. (Commentator: Charles L. Brown, M.D.)

Foster Kennedy Syndrome Associated with an Anomalous Internal Carotid Artery. I. S. Tassman, M.D. (Commentator: Bernard J. Alpers, M.D.)

Regular Meeting, March 16, 1944

Hypertensive States and Incident Changes Occurring in the Fundus Oculi. Grady E. Clay,* M.D. (Commentators: Truman G. Schnabel, M.D., and Edward Weiss, M.D.)

Regular Meeting, April 20, 1944

Pseudobuphthalmos. Wilfred E. Fry, M.D., and L. B. Cohen,* M.D. (Commentator: Louis Lehrfeld, M.D.)

A Corneal Scleral Suture for Intraocular Surgery. Carroll R. Mullen, M.D. (Commentator: Charles R. Heed, M.D.)

* *By invitation.*

[1] With the Philadelphia Endocrine Society.

[2] With the Orthopedic Section of the Philadelphia County Medical Society.

[3] With the Philadelphia Urological Society.

[4] Abstracts of the transactions of this Section customarily appear in the *American Journal of Ophthalmology* and the *Archives of Ophthalmology.*

Orbital Cellulitis Successfully Treated with Penicillin. Henry O. Sloane,* M.D. (Commentator: C. E. G. Shannon, M.D.)

Traumatic Perforations of the Eye-ball. Glen G. Gibson, M.D. (Commentator: Edmund B. Spaeth, M.D.)

SECTION ON OTOLARYNGOLOGY[5]

Joint Meeting,[6] January 19, 1944

Suture of the Tonsillar Pillars as a Prevention of Hemorrhage in Local and General Tonsillectomies. Isaac B. High, M.D. (Commentator: George M. Coates, M.D.)

Why We Should Organize a Pennsylvania Academy of Ophthalmology and Otolaryngology. James E. Landis, M.D.

Reconstruction of Frontal Bone with Tantalum Implant following Removal of Osteoma. (Moving Picture in Color.) Capt. John J. Conley, (MC). (Commentator: Major Marshall B. Stewart, (MC).)

A Typical Rhinoplasty Operation. Romeo A. Luongo, M.D. (Commentator: Samuel Fomon, M.D.)

Joint Meeting,[6] February 16, 1944

SYMPOSIUM ON REHABILITATION OF THE DEAF AND HARD OF HEARING: CIVILIAN AND SOLDIER

The Civilian Point of View. Fletcher D. Woodward, M.D.

The Army Point of View. Lt. Col. Marion R. Mobley, (MC). (Commentators: James A. Babbitt, M.D., George M. Coates, M.D., Walter Hughson, M.D., and Harold Westlake, M.D.)

Joint Meeting,[6] March 15, 1944

Vertical Nystagmus Produced by Peripheral Labyrinthine Lesions. E. Spiegel, M.D., and N. Scala, M.D. (Commentator: Benjamin H. Shuster, M.D.)

Cure of Staphylococcic Meningitis of Otitic Origin with Penicillin. Major Wendell D. McCollum, (MC).

Open Reduction of a Depressed Fracture of the Malar Bone with Myoplasty. (Motion Picture in Color.) Major Marshall B. Stewart, (MC).

Management of Depressed Nasal Fractures. Henry A. Miller, M.D. (Commentator: Samuel Cohen, M.D.)

Joint Meeting,[6] April 19, 1944

SYMPOSIUM ON CHEMOTHERAPY AND BIOTHERAPY IN OTOLARYNGOLOGY

Chemotherapy. Daniel S. Cunning, M.D.

Biotherapy. John A. Kolmer, M.D.

(Commentators: William L. White, M.D., and Harrison F. Flippin, M.D.)

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

March 6, 1944

RECENT DEVELOPMENTS IN DISEASE PREVENTION THROUGH AIR STERILIZATION

Results in the Use of Triethylene Glycol as an Air Sterilizant. Joseph Stokes, jr, M.D., and T. N. Harris, M.D.

Air Disinfection. William F. Wells.

[5] Abstracts of the transactions of this Section customarily appear in the *Archives of Otolaryngology*.

[6] With the Philadelphia Laryngological Society.

TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

Volume 12 (Fourth Series)

Number 3 (December 1944)

Some Experiences with the Surgical Treatment of Hypertension in Man*

By R. H. SMITHWICK, M.D.

Massachusetts General Hospital, Boston, Massachusetts

FOR over ten years a clinical investigation of hypertension in man has been in progress at the Massachusetts General Hospital. This has been a combined medical and surgical endeavor. We have been primarily concerned with the rôle of the autonomic nervous system and of vascular disease, particularly in the renal area, as mediators of hypertension. Two attempts have been made to obtain data concerning the possibility of humoral mediators of hypertension by studying small groups of cases in collaboration with other investigators particularly interested in this mechanism. These were non-contributory, since no satisfactory method of demonstrating the presence of circulating pressor substances in man has as yet been devised. Some difficulties encountered during bio-assays for circulating pressor substances have recently been discussed by Landis (1).

Most observers are agreed, that persistent elevation of the diastolic pressure is due to increased peripheral resistance to blood flow offered by the arteriolar bed rather than the result of an alteration of cardiac output, blood volume, or viscocity. The increased peripheral resistance to blood flow appears to be the total of that offered by vascular disease on the one hand, and increased tone of smooth muscle on the other. The component of vascular disease may be subdivided in two parts, that affecting the arterioles, and that affecting the larger vessels. The former presumably affects the diastolic level in particular, and the latter, because of decreased elasticity, the width of the pulse pressure. Increased tone of smooth muscle may be divided into two components, that mediated by the autonomic nervous system and that offered by circulating humoral substances which might have a constrictor effect either by direct action upon blood vessels or by indirect activation of the nervous system.

To determine the extent to which increased tone of smooth muscle mediated by the nervous system was a factor, carefully studied hypertensive patients were subjected to maneuvers designed to disconnect a part of the arteriolar bed by surgical ablation of a portion of the autonomic nervous system. Our primary measure of success was the lowering of diastolic blood pressure. It may be stated at this point that whenever we have been successful in so doing, the result has been to the benefit of the patient. Contrary to the expectations of many, lowering of blood pressure has been helpful, not harmful. Favorable changes in eyegrounds, electrocardiograms, and renal function together with a sense of well-being of the patient are other favorable indications (2, 3).

The first question to arise was what portion of the vascular bed should be denervated. The second question was how could this be accomp-

* Read at the joint meeting of the Philadelphia County Medical Society and the College of Physicians of Philadelphia, September 13, 1944. Printed, without the figures, in *Philadelphia Medicine*, October 28, 1944.

lished. Since the visceral vascular bed, the splanchnic bed, contains a large percentage of the arterioles of the body, this area seemed to be of particular importance. Various operative maneuvers which had been suggested were performed upon small groups of cases. In general our successes were far outnumbered by our failures in the early years. Occasional successes encouraged us to pursue the matter further. Because of the frequent anatomical variations encountered and because these earlier operations were not followed by physiological evidence of a thorough denervation of the visceral vascular bed, our first step was to increase the extent of removal of the sympathetic trunks by multiple stage operations on a small series of patients classified as failures following previous maneuvers. As the extent of the operation was increased, physiological evidence of a thorough denervation of the visceral vascular bed, namely postural hypotension in the acutely denervated state, was noted. Also, some of the failures were transformed into successful results as judged by a significant lowering of blood pressure.

By the end of the fifth year of this investigation, we felt reasonably certain of our ability to thoroughly denervate the visceral vascular bed, and since that time have performed a more extensive operation upon another series of hypertensive patients. It consisted of the removal in two stages of the great splanchnic nerves from the celiac ganglia to the midthoracic level and the excision of the sympathetic trunks from at least D9 to L1 inclusive and at most from D6 to L3 inclusive. The extent of the removal of the trunks has been purposely varied in order to eventually determine the minimal procedure necessary. A combined thoracic and lumbar approach was found necessary, resecting portions of the eleventh and twelfth ribs and dividing the diaphragm in order to obtain the necessary exposure.

During the next three years a small series of patients was operated upon by this technique and it was noted that the percentage of successes exceeded the failures. This operation (4) is more extensive than others which have been employed with the exception of the total or near-total sympathectomy of Grimson (5). We have extended this operation in further stages to include all or most of the cardiac area in several of our failures, thus making it comparable to that of Grimson in these few instances. Our first near-total sympathectomy was performed in 1938. During the past two years in particular, the size of the series subjected to what we have come to call lumbodorsal splanchnicectomy has been increased considerably. Follow-up data has recently become available upon the first 156 cases studied one to five years following operation. The results were recently presented at the last meeting of the American Medical Association (6). They are discussed in considerable detail in that article to which the reader is referred.

Briefly, the effect of operation was graded according to the lowering of the diastolic blood pressure when measured in the resting horizontal position. Only cases with pre-operative diastolic levels of 100 to 162 m.m. were considered. Those with lower levels will be reported separately. The results varied from none at all to a marked lowering of blood pressure. Patients whose diastolic levels were 30 m.m. of mercury or more lower were placed in Group I. This contained 64 cases or 41.0% of the total. In Group II, the level was 20–29 m.m. lower. Thirty-two cases or 20.5% were so tabulated. Group III contained 28 cases or 17.9% of all. The lowering in these was 10-19 m.m., slight but probably significant. The lowering in Group I and II seem almost certainly significant. There were 17 cases, 10.9% of all in Group IV. The lowering in this group was up to 9 m.m., regarded as no change. In Group V, there were 15 cases, 9.7% of all. In these the blood pressure was higher, the average being an elevation of 11 m.m. of mercury. The average duration of follow-up for the entire series was 22.5 months. One-third of the cases were followed for an average of three years and two-thirds an average of 1½ years. There was no significant difference in the results in the two groups. The shortest period of observation was one year, and the longest five years. The operative mortality was 2.8%.

These data were analyzed further in order to cast more light upon the circumstances under which the better results might be expected. It was found desirable to divide the cases into two groups according to sex and to further subdivide each of these into three groups according to the type of hypertension. This has been judged by the width of the pulse pressure in resting horizontal position. In Type I are cases in which the pulse pressure in the resting horizontal position was less than one-half the diastolic pressure. Type II contains those patients with pulse pressures equal to or up to 19 m.m. greater than one-half the diastolic pressure.

In Type III, the pulse pressure was 20 m.m. or more greater than one-half the diastolic pressure. The results varied according to type, being best in Type I and poorest in Type III. The wider the pulse pressure the greater the decreased elasticity of the larger vessels, and apparently the less likely the presence of increased tone of arteriolar smooth muscle mediated by the nervous system. Vascular disease appears to be the most important factor in such cases. In general, females did better than males. The results are tabulated according to sex and types (Table 1).

TABLE 1

Effect of Lumbo-dorsal Splanchnicectomy upon Blood Pressure

	No. Cases	Result				
		Group I	Group II	Group III	Group IV	Group V
Type I						
Males	34	16	5	5	3	5
		61.7%				
		76.5%			23.5%	
Females	33	20	7	5	0	1
		81.8%				
		96.8%			3.2%	
Type II						
Males	16	6	2	4	2	2
		50.0%				
		75.0%			25.0%	
Females	35	14	11	2	6	2
		71.4%				
		77.1%			22.9%	
Type III						
Males	13	1	2	4	4	2
		23.2%				
		53.8%			46.2%	
Females	25	7	5	8	2	3
		47.8%				
		80.0%			20.0%	

To illustrate the effect of operation (figures 1, 2, 3, 4) and to permit a more critical study of each case, certain data has been charted out which gives one a graphic picture of the approximate nature

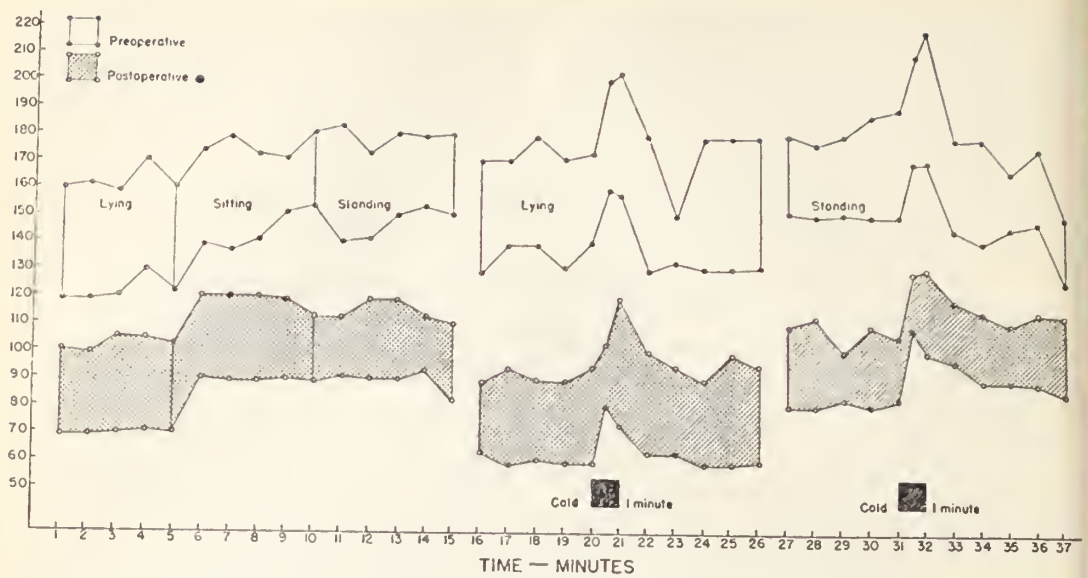

FIG. 1. A 31-year-old male with grade 1 eyes, early congestive heart failure, and normal renal function. Renal biopsy showed grade 3 arteriolar sclerosis. A Group 1 result. Type 1 hypertension. The blood pressure following operation is lowered, the pulse pressure is narrowed slightly, and the reflex responses are essentially unchanged.

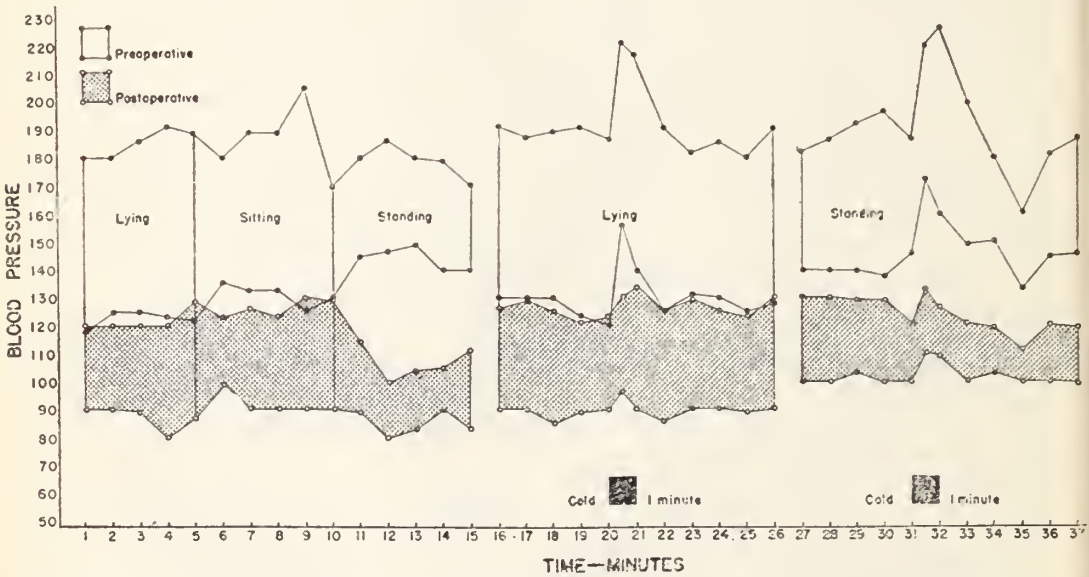

FIG. 2. A 41-year-old male with grade 1 eyeground changes, slightly impaired cardiac function and normal renal function. Renal biopsy showed grade 3 arteriolar sclerosis. A Group 1 result. Type II hypertension. The blood pressure level following operation is lowered, the pulse pressure is narrowed, and the reflex responses are largely abolished.

and magnitude of the hypertensive state of the particular indivdual. Briefly, after a period of hospitalization, most of which time is spent in bed, the patient is taken to a quiet pleasant room and placed upon a comfortable bed. After a rest period of 15–20 minutes, readings of blood pressure and pulse rate are taken every minute for five minutes, the patient first lying, then sitting, then standing.

The patient then assumes the horizontal position, and readings at one minute intervals are continued for five minutes, followed by stimulation by cold for one minute. During this minute, one hand is immersed in ice water up to the wrist (4–5°C.), and readings are taken at 30 seconds and at the end of the minute when the hand is removed. Subsequently, minute readings are continued for five minutes. The cold test is then repeated with the patient in the upright position. The test is a

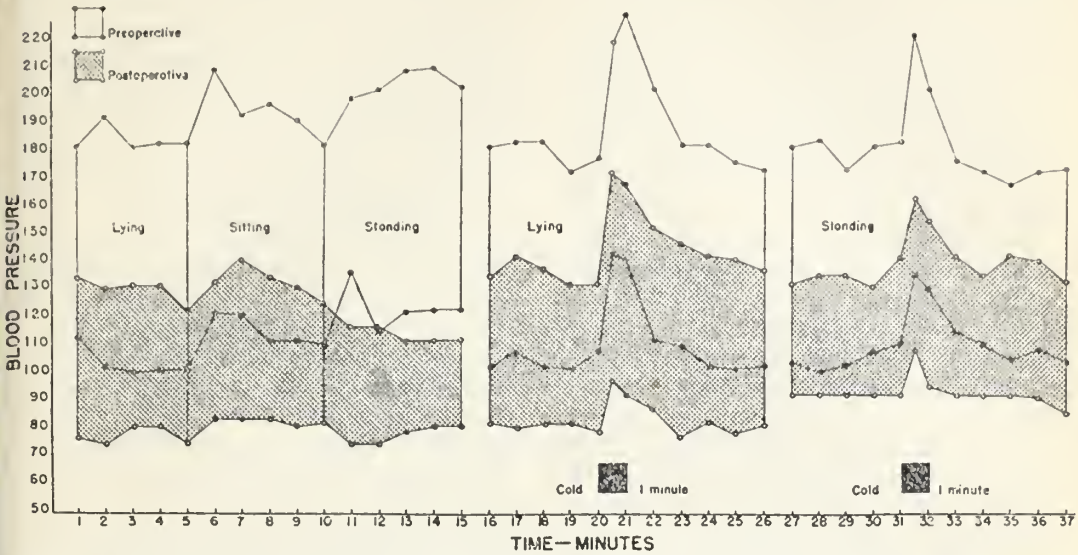

FIG. 3. A 53-year-old female with grade 1 eyeground changes, normal cardiac and renal functions. Renal biopsy showed grade 3 arteriolar sclerosis. A Group 2 result. Type III hypertension. The blood pressure evel following operation is lowered, the pulse pressure is narrowed, and the reflex responses are modified.

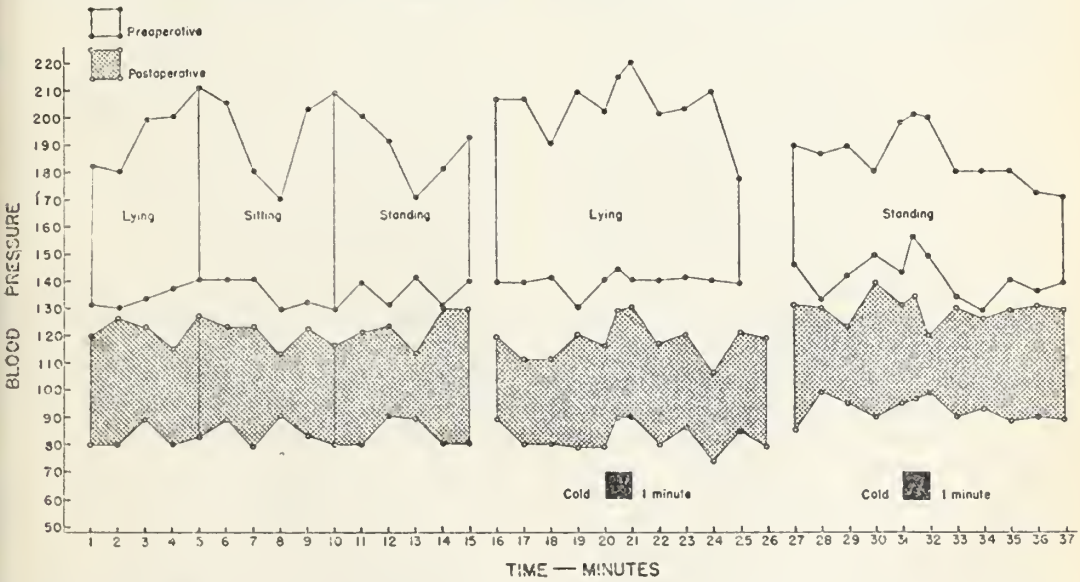

FIG. 4. A 23-year-old female with grade 1 eyeground changes, normal cardiac and renal functions. Renal biopsy showed grade 1 arteriolar sclerosis. A Group 1 result. Type I hypertension. The blood pressure level following operation is lowered, the pulse pressure narrowed. The reflex responses to stimulation were within the normal range both before and after operation.

modification of the Hines-Brown cold test, the latter being preceded by a simple postural blood pressure test and followed by a repetition of the cold test in the upright position. The blood pressure readings are taken by a trained technician. The preoperative and postoperative data are compared, the latter being cross hatched. The postoperative data were obtained one to two years after operation in the various charts which will be used for illustrative purposes.

This series is not yet large enough to subdivide further, but there are many other factors which must be eventually taken into consideration. It seems reasonable to believe that as some of these other variables such as age, duration of hypertension, the preoperative resting blood pressure level, the response to sedation, the state of the brain, the eyegrounds, the heart, and the kidneys, and the presence or absence of humoral causes of increased tone, can be evaluated, it will be possible to select cases for surgery with increasing accuracy.

Some data concerning the renal vascular bed have been obtained during the course of operations upon the autonomic nervous system. The kidney is readily inspected at the time of operation and it has been customary the last few years to take random biopsies from this organ. At first, biopsies were taken from both kidneys, but since the data checked closely, we have been taking a biopsy from one kidney only of late unless some obvious unilateral process was noted. In this series of 156 patients, biopsies were obtained from 125 cases. These have been graded according to the degree of arteriolar disease by Castleman (7, 8). Pathological changes varied from none at all to as marked as is generally seen in autopsy material. There were five grades, 0 to 4. The results have been reviewed in relation to the extent of renal arteriolar damage. Cases with grade 0, 1 and 2 biopsies—no, minimal and mild arteriolar disease, were placed in one group, while those with marked or advanced arteriolar disease, grade 3 and 4, were placed in another. There was no significant difference in the effect of operation upon blood pressure in the two groups. There seems to be no close relationship between the reversibility of hypertension following lumbordorsal splanchnicectomy and the state of the kidney as judged by a study of biopsy material.

Some further data bearing upon the relation of the renal vascular bed to the reversibility of the hypertensive state are also available from a study of the effect of operation in those cases having known primary renal disease such as pyelonephritis. There were eleven such cases among the 156, of which ten had bilateral pyelonephritis and one unilateral. The result of operation was unusually satisfactory in this small series. All showed some degree of reversibility, 7 (63.7%) being in Group I, 3 (27.3%) in Group II, and 1 (9.0%) in Group III. Thus, the presence of known primary renal disease, pyelonephritis, did not appear to detract from the result of operation.

As we study the hypertensive state in man, particularly as we study it in reverse, we find data bearing upon certain of the numerous factors, which combine in many different proportions to result in high blood pressure. To return to the matter of increased tone mediated by the nervous system, it is clear that the tone of smooth muscle in most hypertensive patients is very variable. Unusual rises in blood pressure in response to many different stimuli such as pain, cold, emotion, breath holding (CO_2) and shift of position exist. This form of increased tone, particularly the abnormal response to cold, a rise of more than 20/15 m.m. when stimulated by cold in the resting horizontal position, has been called hyperreactivity by Hines and Brown (9. 10). The capacity for the summation of the effects of different stimuli exists. This results in intermittent hypertension, the severity and frequency of which depends upon the number of different stimuli to which a given patient will respond, and the frequency with which the stimuli are applied. This appears to be the earliest stage of hypertension.

As time goes on, the blood pressure in the resting horizontal position remains persistently elevated. This is the stage to which most patients we have subjected to surgical maneuvers have progressed. A tremendous hiatus exists in our knowledge of the transition from the normal to the stage of intermittent hypertension, to the stage of continued hypertension with, in most instances, the same intermittent superimposed upward variations. By this time, arteriolar disease, as evidenced by biopsy material generally exists, in various vascular areas, renal and extra renal, but is not necessarily present in any particular area. The degree to which the larger vascular bed has become affected is reflected in the width of the pulse pressure, being comparatively narrow in some cases and extremely wide in others.

As we study the hypertensive state in reverse (figures 1, 2, 3, 4), it becomes apparent that in the

stage of persistent hypertension a form of continued increased tone of smooth muscle mediated by the nervous system exists in the majority of hypertensive patients in addition to the intermittent type. The lowering of pressure following surgical intervention upon the autonomic nervous system appears to be the result of a decrease in this form of continued increased tone of arteriolar smooth muscle.

The effect of operations, of the order of magnitude under discussion, upon intermittent tone, hyperreactivity, varies from none at all to a marked or complete abolition of this phenomenon. It is possible to have, in some cases, a marked general lowering of blood pressure with little or no reduction in the magnitude of the reflex responses (figure 1). Under these circumstances the ceiling levels are lower than before operation because the level is lower before the stimulus is applied. In other cases the reflex responses are largely abolished in addition to a lowering of the basal level (figure 2). In other cases the reflex response is modified as well as the basal level (figure 3). In general, as hypertension develops the pulse pressure widens and as the disorder is reversed by sympathectomy the pulse pressure becomes narrower. Occasionally it may be wider if the diastolic fall exceeds the systolic drop. The great difference in the width of the pulse pressure in hypertensives is of interest not only because it is related to reversibility, but also because it indicates a different response to increased stress and strain suggesting the participation of other factors in the causation of different types of hypertension in man.

There are occasional exceptions to the general rule that most hypertensive patients hyperreact to stimuli such as cold. In these (figure 4) the emphasis is upon increased tone associated with reactivity of the order of magnitude seen in most normal individuals (6). These instances have not been common and most hypertensives show unusual evidence of reactivity of the same nature and general order of magnitude as seen in about 15% of normotensive individuals (6). There is considerable evidence in the literature, particularly in the writings of Hines and Brown, which indicates that hyperreactivity in normotensive patients should be considered a pre-hypertensive state and they appear to be much more likely to develop hypertension than individuals with more stable vascular beds (11–15).

There is another, very unusual, physiological mechanism which we have encountered twice in hypertensive patients, namely, continued nonparoxysmal diastolic hypertension associated with postural hypotension and the absence of a reflex response to stimulation by cold. Both of these patients have exhibited this unusual response, and both were found to have a pheochromocytoma, an adrenal tumor of medullary origin, at operation. In both instances the hypertension was cured by removal of the tumor. There is no reason to doubt that these are examples of hypertension mediated by a circulating humoral substance presumably of an adrenaline-like nature. Physiologically speaking, the data indicate clearly that a continued cause of increased tone existed which was associated with definite evidence of hyporeactivity of the nervous system. This type of response is quite different from that noted in most hypertensive patients. The preoperative postural hypotension in these cases is identical with that seen in hypertensive patients in the acutely denervated state following thorough interruption of the vasoconstrictor pathways to the splanchnic bed. It is characterized by a fall in both systolic and diastolic pressures associated with an increase in pulse rate and a decrease in pulse pressure, as the patient shifts from the horizontal to the upright position.

Summary

Our studies of hypertension in man indicate that continued diastolic hypertension is usually associated with evidence of hyperreactivity of the vascular bed. The latter appears to antedate the former. Attention is called to the various probable stages in the development of hypertension in man, from the pre-hypertensive state to the stage of intermittent hypertension, to the stage of continued diastolic hypertension. The lack of detailed knowledge of this important transition should be emphasized. The cooperation of all physicians is needed to clarify this matter. Hypertensive patients rarely have any accurate knowledge of the exact duration of their disorder. Our data indicate that as hypertension develops the pulse pressure widens, but that there is a great variation in the magnitude of this change. As hypertension is reversed, the pulse pressure becomes narrower. The narrower pulse pressure forms of hypertension have responded better to surgical intervention upon the autonomic nervous system, and in general females have done better than males. What appears to be a significant

degree of reversibility has been noted in the majority (61.5–79.4%) of hypertensive patients who have been operated upon with preoperative resting diastolic levels of 100–162 m.m. of mercury. A significant fall in diastolic pressure may be associated with no change or a marked reduction in the degree of vascular reactivity. In either case, the ceiling levels are lower. The lowering of blood pressure following lumbodorsal splanchnicectomy appears to be due to a decrease in the tone of the arterioles of the visceral vascular bed. As some of the other factors can be evaluated, we may expect to be able to predict the response of a given patient to operation with increasing accuracy. Such data as are available concerning the renal vascular bed indicate that neither the grade of arteriolar disease in this particular area, as judged by biopsy material, nor the presence of known renal disease such as pyelonephritis, appeared to affect the reversibility of hypertension following lumbodorsal splanchnicectomy. Attention has been called to certain cases of continued hypertension which may be reversible and which were not associated with evidence of hyperreactivity during the preoperative postural and cold test. In these the reflex responses were normal. On the other hand, two cases of continued non-paroxysmal hypertension associated with a hyporeactive nervous system, particularly postural hypotension, have been cited as being probable examples of hypertension mediated by a circulating pressor substance. The rôle of pressor substances in the mediation of so-called essential hypertension in man has not as yet been clarified. It seems probable that vascular disease, by increasing the peripheral resistance to blood flow, by decreasing the elasticity of the larger vessels, and by decreasing the capacity of the vascular bed is an important ultimate factor which limits the reversibility of the hypertensive state in man.

BIBLIOGRAPHY

(1) Landis, E. M., Wood, J. E., Jr., and Guerrant, J. L.: Effect of heparin on vasoconstrictor action of shed blood tested by perfusion of rabbit's ear. Am. Journ. Physiol., **139:** 26–38, 1943.

(2) Evans, E., Smithwick, R. H., and White, P. D.: The Electrocardiogram in Hypertension. 2. The Effect of Radical Lumbodorsal Sympathectomy. Am. Heart J. In press.

(3) Canabal, E. J., Warneeford-Thomson, H. F., and White, P. D.: The Electrocardiogram in Hypertension. 3. Electrocardiograms of hypertensive patients followed for a long time without splanchnic resection in comparison with those who had had splanchnic resection. Am. Heart J. in press.

(4) Smithwick, R. H.: A technique for splanchnic resection for hypertension. Surgery, **VII,** 1–8, 1940.

(5) Grimson, K. S.: Total thoracic and partial to total lumbar sympathectomy and celiac ganglionectomy in treatment of hypertension. Ann. Surg., **114:** 753–775, 1941.

(6) Smithwick, R. H.: Surgical Treatment of Hypertension: The Effect of Radical (Lumbodorsal) Splanchnicectomy on the hypertensive state of 156 Patients followed 1 to 5 Years. Archives of Surgery. **49:** 180–193, 1944.

(7) Castleman, B., and Smithwick, R. H.: The Relation of Vascular Disease to the Hypertensive State. Based on a Study of Renal Biopsies from one hundred Hypertensive Patients. J. A. M. A., **121:** 1256–1261, 1943.

(8) Talbott, J. H., Castleman, B., Smithwick, R. H., Melville, R. S., and Pecora, L. J.: Renal Biopsy Studies correlated with Renal Clearance observations in Hypertensive Patients treated by radical sympathectomy. Jour. Clin. Invest., **XXII:** 387–394, 1943.

(9) Hines, E. A., Jr., and Brown, G. E.: A Standard stimulus for measuring vasomotor reactions: Its application in the study of hypertension. Staff Meet. Proc. Mayo Clinic **7:** 332–335, 1932.

(10) Hines, E. A., Jr., and Brown, G. E.: A Standard test for measuring the variability of Blood Pressure: Its significance as an index of the prehypertensive state. Ann. Int. Med., **7:** 209–217, 1933.

(11) Hines, E. A., Jr.: Reaction of the Blood Pressure of 400 school children to a standard stimulus. J. A. M. A., **108:** 1249–1250, 1937.

(12) Hines, E. A., Jr.: The heredity factor in essential hypertension. Ann. Int. Med., **11:** 593–601, 1937.

(13) Hines, E. A., Jr.: The significance of vascular hyperreaction as measured by the cold-pressor test. Am. Heart Journ., **19:** 408–416, 1940.

(14) Hines, E. A., Jr.: Range of normal blood pressure and subsequent development of hypertension. J. A. M. A., **115:** 271–274, 1940.

(15) Hines, E. A., Jr.: The background and treatment of hypertensive disease. Southern Med. and Surg., **103:** 301–306, 1941.

The Gastrointestinal Hormones: Their Physiology and Application*

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Historical

ONLY one point of historical interest will be mentioned. The hormone secretin was discovered in 1902 by Bayliss and Starling (1). As a result of the discovery, Bayliss and Starling coined the term hormone, and the search for additional gastrointestinal hormones was initiated.

Some General Analogies

The mucosa of the alimentary tract is a close rival of the anterior lobe of the pituitary gland in regard to the number of endocrine principles produced. It is generally recognized that the anterior lobe produces 8 endocrine principles; 6 are sometimes referred to as somatic factors and 2 as metabolic factors. The gastrointestinal mucosa is alleged to produce 9 endocrine principles; the existence of 8 of the 9 has not been challenged.

The chemical nature of the endocrine principles of the anterior lobe and alimentary mucosa appear to be of the same general nature. They are proteins or nitrogenous substances. This seems to be characteristic of the endocrine tissues which arise from the ectoderm and endoderm, whereas those which arise from the mesoderm are sterones.

The hormones of the anterior lobe like those of the intestine have been difficult to isolate. The chemical structure of none of the anterior lobe hormones is known. The same obtains for the gastrointestinal hormones, unless histamine is classified as a gastric hormone. One of the anterior lobe endocrine principles has been reported to have been crystallized, namely, prolactin, though this has not been confirmed (2). Another, namely, the growth hormone, has recently been reported to have been isolated (3). Only one of the gastrointestinal hormones, namely, secretin, has been crystallized, if histamine is excluded. The crystallization of secretin has been confirmed (4, 5). Recently Greengard (6) has apparently obtained the gastric secretory inhibitory fraction of enterogastrone in crystalline form. Three and perhaps four of the gastrointestinal hormones have been either isolated or concentrated (secretin, cholecystokinin, enterogastrone, histamine) and have been given to man and their specific effect on the gastrointestinal organ observed.

Do The Known Gastrointestinal Hormones Play a Vital Rôle In Animal Economy?

The absence of the anterior and posterior lobe of the pituitary is compatible with survival for months or several years provided careful care is given such animals and man. The absence of the thyroid and gonads is also compatible with survival. The absence of the parathyroids, the islet cells of the pancreas and the cortex of the adrenals requires some form of substitution therapy for survival. In the case of the parathyroids survival after the first few weeks may not require therapy except during periods of "stress".

It is probable that none of the *known* gastrointestinal hormones are vital in the sense that they are necessary to maintain life. They appear only to serve as factors of safety in digestion and absorption, because other mechanisms for the secretory and motor activity of the alimentary tract could probably function adequately in their absence. The loss of cholecystokinin might lead to stasis in the gall bladder with the consequences of such stasis. The loss of secretin and pancreozymin might in some instance cause steatorrhoea and azotorrhea and the loss of enterogastrone might predispose to duodenal ulcer.

Does the intestinal mucosa produce a hormone or substance which is essential for intestinal absorption, for the maintenance of the vital rôle of the liver, or for other vital tissues in the body? Or, is the intestine a

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vital organ? We have attempted to answer this question by performing a complete enterectomy and nourishing the animals parenterally. (The head and tail of the pancreas was not removed; the bile and gastric secretion was drained to the outside and collected in rubber bags.) The animals survived two weeks or more; the longest survival was 32 days. We have gained the impression that the early death of the animals is due to the technical difficulties incident to their care and nourishment, rather than to the loss of some vital function of the intestinal mucosa. Bile secretion was small (20-30 cc.); infection did not account for the death.

In this presentation I shall only consider those gastrointestinal hormones with which I am most familiar. (For a consideration of the other hormones see reference 12 and 39.)

The Hormone For Gastric Secretion—"Gastrin"

When a dog with an autotransplanted pouch of the stomach is fed the transplant is stimulated to secrete (7). This shows that when the animal is fed something enters the blood stream and stimulates the pouch. The humoral agent may be a hormone elaborated by the gastrointestinal mucosa or it may be secretagogues, present in or produced by the digestion of food, absorbed from the lumen of the stomach and intestine.

We have conducted a great number of experiments to ascertain whether the humoral agent is a hormone or absorbed secretagogues. The results of these experiments have been described and reviewed elsewhere (8). A critical consideration of the evidence shows that the existence of a hormone for the action of secretagogues in the stomach has *not* been unequivocally established. The evidence is strongly presumptive, however. One point of evidence is that histamine-free liver extract (#343, Lilly; Lederle's or Wilson Lab. concentrate) when applied to the main stomach causes a gastric transplant to secrete. It is unlikely that secretagogues in the stomach act by being absorbed into the blood, because secretagogues are more potent when applied to the gastric mucosa than when injected slowly intravenously. The possibility that gastric juice acts on the secretagogues to produce some substance that is absorbed is improbable because, if the secretagogues in liver extract are digested with gastric juice, the response is either unaffected or diminished (10).

If one had a stimulating agent which can not be absorbed by the stomach, and if the application of the stimulating agent to the main stomach would cause the gastric transplant to secrete, then the production of a hormone would be established. Distension of the stomach by a balloon would be such a stimulus. However, on many occasions we have distended the main stomach without causing secretion in the gastric transplant. Recently we (Grossman and Ivy) prepared an animal with a very large transplanted gastric pouch. This transplanted gastric pouch secreted in 15 experiments in which the stomach was distended by a balloon.

We (Grossman, Dutton and Ivy) have found that nausea produced by mechanically irritating the gastrointestinal tract inhibits the secretion of a transplanted gastric pouch. Thus, there are three reasons which have in the past apparently prevented us from observing secretion in a transplanted pouch when the stomach is distended. They are: (*a*) secretagogues applied to the stomach constitute a more potent stimulant to hormone production than distension; (*b*) the transplants used have been too refractory; and (*c*) undue distension caused nausea which in some way inhibited secretion by the pouch.

If a gastric hormone exists, as I believe it does, what is its nature? I have been referred to in some textbooks as having proved that histamine is the gastric hormone. That is incorrect. When Sacks, Burgess, VanDolah and I (11) did our work on the chemical nature of Edkin's "gastrin", we concluded that either "histamine is the gastric hormone, and if not, there is no gastric hormone, or the gastric hormone has never been extracted from the pyloric mucosa."

Komarov (12) has reported the preparation of an extract of pyloric mucosa free of histamine which stimulates gastric secretion, on parenteral administration. Our attempts to obtain an active, histamine-free extract have met with failure, but we are still working on the problem.

Whether the gastric hormone is histamine or some other substance is an open question. No one has been able to show that the histamine content of the blood increases after a meal. But, none of the present methods for assaying histamine in the blood are sufficiently sensitive to detect a change in the histamine concentration of the blood when 1 mg. is injected subcutaneously in the dog.

Application: If histamine is the gastric hormone, we then know the practical uses of the gastric hormone, because it has been and is being used to test gastric secretory function. If the gastric hormone

is not histamine, when isolated it will probably be more useful than histamine because it would quite likely not cause headache and flushing when used for testing gastric function.

It is quite likely that histamine is a humoral stimulant of gastric secretion in abnormal conditions. It is well known that injured cells release histamine (13). It is known that irritation of the skin or cutaneous allergic reactions may be associated with an increase in gastric secretion. The hypercontinuous secretion of patients with "peptic" ulcer may be due to histamine production on the basis of reasoning by analogy. For example, in "peptic" ulcer the surrounding tissues are inflamed and injured, and the secretion cannot be abolished by ordinary doses of atropine (14).

Secretin

The existence of secretin has been definitely established. It has been crystallized (4, 5). Crystalline secretin increases the volume of pancreatic juice, the total output of bicarbonate and enzymes. The concentration of enzymes in such juice is less than in the juice collected before the injection of secretin. Crystalline secretin also increases the volume output of bile by direct action on the liver (15); the response is relatively less than the pancreatic response, however.

Application. Secretin has been injected intravenously in human subjects (16). Much investigation has shown that secretin is useful in establishing the presence of injury to the acinar tissue of the pancreas (17). Lagerlof (18) has recently published his extensive experience with secretin in the diagnosis of pancreatic disease. We have found it useful in differentiating relative or absolute pancreatic achylia from sprue, idiopathic steatorrhoea, and coeliac disease. It is of assistance in differentiating coeliac disease from cystic fibrosis of the pancreas (20). Recently Popper and Necheles (19) have reported that an injection of secretin will increase the serum lipase in the presence of obstruction to the outflow of pancreatic juice.

Pancreozymin

Pancreozymin is present in extracts of the upper intestinal mucosa and increases the secretion of enzymes by the pancreas. It has no effect on the volume of secretion. Its existence was demonstrated by Harper and Raper (21) in 1943. The observations of Harper and Raper have been confirmed by us (22). When we inject crystalline secretin continuously intravenously and then add a certain fraction of intestinal extract which contains no secretin, the concentration of the enzymes in the pancreatic secretion is definitely increased.

The discovery of pancreozymin in certain extracts of the duodenal mucosa explains the discrepancies in the literature regarding whether secretin stimulates the concentration of enzymes in pancreatic juice. We have always found that all our preparations of secretin, except crystalline secretin, increase the output and usually the concentration of pancreatic enzymes in duodenal fluid and pancreatic juice. Some agreed and others disagreed with this observation. We now know that pancreozymin is present in all of our preparations of secretin up to the final step taken for the production of crystalline secretin.

Application. When both pancreozymin and secretin are present in the solution to be used in testing pancreatic function, it would seem to be unnecessary to use drugs such as prostigmine or mecholyl to insure a copious output of pancreatic enzymes.

Cholecystokinin

The existance of a hormone which causes the gallbladder to contract and evacuate has been established by cross-circulation experiments (23) and by autotransplanting the gallbladder into the neck of dogs (24). Evidence obtained from blood transfusions in man indicate that the hormone is produced in man (25).

The active principle, called cholecystokinin, has been separated from secretin (5, 26), but it has not been crystallized. It causes the human gallbladder to evacuate (27), though a preparation for clinical use is not commercially available.

A carbohydrate meal is the only meal which does not in some way cause the production of the hormone and appreciable gallbladder evacuation. Sussman (29) reports in confirmation of Crandall that the human gallbladder remains visualized as long as 5 days when his subjects fasted or ingested only a carbohydrate diet. Egg yolks and cream (the Boyden meal) are the most potent natural foods for the production of cholecystokinin. The acid of gastric juice is also potent.

Application. A number of studies on pregnant women have shown that their gall bladder as a rule does not empty well (30, 31). Gerdes and Boyden (30) thought this might be due to increased tone of

the sphincter of Oddi. This was studied by Smith, Pomaranc and Ivy (28) and by Myers and Hill (32) who found that the gallbladder of the guinea pig in pregnancy is less responsive to the cholecystokinin. Estradiol given to castrated females mimicked this effect of pregnancy. Since an enzyme has been found in the serum which inactivates cholecystokinin (33), it would be of interest to study the concentration of the enzyme in the serum of pregnant women who manifest delayed gallbladder evacuation.

I believe that cholecystokinin should prove to be of value as an agent for determining whether the gallbladder of a patient evacuates normally. A standard dose could be given intravenously and hence the variable rate of evacuation of a Boyden meal from the stomach would be avoided. The use of the hormone should prove to be of value in the diagnosis of biliary dyskinesia. If the sphincter of Oddi is hypertonic, the injection of the hormone should cause contraction of the gallbladder, with typical biliary tract distress and visualization of the hepatic ducts (34, 35). The results should be more reliable and subject to repetition than when a Boyden meal is used.

Enterogastrone—Three Principles?

Enterogastrone is a term which refers to the gastric secretory, inhibitory, and motor inhibitory effect of a fraction of an extract of the upper intestinal mucosa. Urogastrone is a term which refers to a fraction of an extract of urine which has similar physiological properties.

We possess considerable unpublished evidence which shows that the secretory inhibitory principle can be separated from the motor inhibitory principle. We have not published the evidence because we have not been able to concentrate the motor inhibitory principle to the same extent as the secretory inhibitory principle and this might indicate that we are only inactivating the former. Another interesting and provocative observation is that the gastric motor inhibitory substance in our "enterogastrone" preparation does not inhibit the motility of the vagotomized or transplanted stomach, whereas a fat or sugar meal or more crude extracts do. This is a subject that has not been elucidated.

These observations suggest that what is ordinarily called enterogastrone may consist of three principles: one which inhibits gastric secretion, a second which inhibits the motility of the vagotomized stomach and a third which inhibits the motility of the normally innervated stomach.

The existence of substances which inhibit the motility (36) and secretion (37) of the stomach when a meal containing 10 per cent or more of fat or sugar is ingested has been definitely established and repeatedly confirmed (38, 39). That the inhibition is not due to the absorption of the products of digestion of fat and sugar has also been demonstrated (39).

Urogastrone. This term refers to the gastric inhibitory factors in a pyrogen free extract of urine. The term was coined because it is not certain that the inhibitory factors in urine are identical with those produced in the intestinal mucosa. The present status of urogastrone has been reviewed by Gray (40). We have done practically no work on this subject since the War started.

Application. With the idea that enterogastrone might be of value in the therapy of difficult cases of peptic ulcer, we decided to ascertain whether the injection of an enterogastrone preparation would prevent peptic ulcer in Mann-Williamson dogs. These dogs are prepared with a gastrojejunostomy and with the alkaline pancreatic juice and bile draining into the last 15 cm. of the ileum.

We have records on 114 untreated control M-W dogs. Ninety-eight per cent of these animals developed ulcer and died in 1 to 9 months, or an average of 3.8 months. Ten M-W dogs treated intravenously with an extract of pork muscle, made like the enterogastrone preparation, developed ulcer in 1.25 to 4.5 months, or an average of 4 months. These animals served as controls.

Twenty-five animals were operated and injected intravenously with our enterogastrone preparation. Six or 24 per cent developed ulcer in 1 yr. Eight died without ulcer. The remaining 11 were explored and no ulcer was found at the end of 1 yr. The treatment was then stopped in the 11 dogs with the idea of permitting an ulcer to occur and then ascertaining whether it could be healed with enterogastrone. We expected an ulcer to occur on an average of within 2–4 months, because when we had prevented ulcer with aluminum phosphate gel, ulcers occurred in that period of time after stopping the aluminum. But, the 11 animals did not develop ulcer as expected. Of the 11, 3 died without ulcer between 11 and 12.5 months after

stopping therapy, and 2 developed ulcer at 18 and 28 months after stopping therapy. Five are now alive without ulcer almost 3 years after stopping therapy.

This indicates that the treatment in some way prevented or delayed the onset of recurrences. The observation that 2 of the dogs developed ulcer 18 and 28 months after stopping the treatment is interpreted as indicating that the protective effect of the treatment had been lost.

Sandweiss and his associates (41) have recently observed a similar long lasting protection against recurrences in M–W dogs after the cessation of therapy, in which an extract of human urine was used.

To ascertain if the preparation of enterogastrone is active subcutaneously, nine M–W animals were injected subcutaneously daily for one year. One, or 11 per cent, developed ulcer. Three died without ulcer after one year, and 5 are still alive 15 months without ulcer after stopping the therapy.

Five M–W dogs were injected subcutaneously daily for only 3 months after the operation. One died with ulcer, one without ulcer at 4 months, and 3 are still alive 11 months after stopping treatment.

Five M–W dogs were injected subcutaneously daily for 3 months before the operation after which no treatment was given. Two of the five have developed ulcer and died 7 months after the operation and 3 are alive without ulcer 11 months after the operation.

We have made some attempt to ascertain the mechanism of the protection. It has been found that untreated M–W dogs show a prolonged gastric secretory response to an alcohol test meal. The M–W dogs which were protected by the therapy responded like normal dogs to the alcohol test meal (42). This observation, however, is not adequate in our opinion to explain the protection. We suspect with Sandweiss and his associates (41) that the preparation contains some principle which either increases the resistance of the mucosa to ulceration or promotes repair and healing.

Because of the natural history of "peptic" ulcer in man it will be very difficult to prove that "enterogastrone therapy" will protect against recurrences. According to one report 65 per cent of patients will have a recurrence within 2 years. According to another only 63 per cent will have a recurrence in 5 years (43, 44). According to Eusterman and Balfour (45), "under favorable circumstances and adequately sustained treatment, there is a possibility of five-year cure for duodenal ulcer in at least 50 per cent of cases."

Nevertheless, in March 1943, we started to treat a series of ulcer patients. Since our facilities for making the preparation are limited, we selected only patients with a history of frequent recurrences or who, because they would not follow a strict ulcer management, had been experiencing more or less distress for a period of years. Thirty-three patients have been injected from 5 to 6 times a week for from 4 to 12 months and have been observed from 6 to 18 months.

The preliminary observations have been summarized elsewhere (46). The only statement warranted at this time is that the results are sufficiently encouraging to cause us to continue with the study.

Summary

The following statements summarize my opinion of the present status of the gastrointestinal hormones.

I. The existence of the following hormones have been established by physiologic methods and adequate confirmation: (1) *Secretin*, (2) *Cholecystokinin* and (3) "*Enterogastrone.*" Secretin has been crystallized and its crystallization confirmed. Secretin is useful for the absolute diagnosis of pancreatic achylia or degeneration of the pancreatic acinar tissue. Cholecystokinin may be useful as a test of the functional capacity of the gallbladder to empty and for the diagnosis of biliary dyskinesia. "Enterogastrone" may prove to be useful for the management of peptic ulcer; the evidence from animal experimentation is quite convincing.

II. The existence of the following hormones have apparently been established by physiological methods but lack adequate confirmation: (4) *Gastrin*, (5) *Enterocrinin*, and (6) *Pancreozymin*. Gastrin may or may not be histamine, but is difficult to avoid the conclusion that a gastric hormone exists. Enterocrinin, a hormone which stimulates the secretion of intestinal juice, exists on the basis of the evidence submitted by Nasset (39, 47). The existence of pancreozymin has been confirmed, though it should be further confirmed and isolated.

III. The following postulated hormones require further detailed analytical study and their exist-

ence as specific substances require confirmation: (7) *Villikinin* and (8) *Enterocin*. Villikinin is supposed to stimulate specifically the movements of the villi. Enterocin is supposed to stimulate specifically the motility of the intestine.

IV. Duodenin, incretin, excretin, and insulotropic hormone are synonymous terms used to designate a hormone produced by the intestinal mucosa which lowers the blood sugar by influencing carbohydrate metabolism or by increasing the output of insulin. I do not believe the evidence shows that such a substance exists; it does indicate that it may be worth while to examine the hypothesis further (12, 39).

REFERENCES

(1) Bayliss, W. M., and Starling, E. H.: J. Physiol., **28:** 325, 1902.

(2) White, A., Catchpole, H. R., and Long, C. N. H.: Science, **86:** 82, 1937.

(3) Li, C. H., and Evans, H. M.: Science, **99:** 183, 1944.

(4) Hammarsten, E., Jorpes, E., and Ågren, G.: Biochem. Ztschr., **264:** 272, 1933.

(5) Greengard, H., and Ivy, A. C.: Am. J. Physiol., **124:** 427, 1938.

(6) Greengard, H.: Unpublished.

(7) Ivy, A. C., and Farrell, J. I.: Am. J. Physiol., **74:** 639, 1925.

(8) Ivy, A. C.: Surgery, **10:** 861, 1941; Schiffrin, M. J., and Ivy, A. C.: Arch. Surg., **44:** 399, 1942.

(9) Butler, D. B., Hands, A. P., and Ivy, A. C.: Am. J. Physiol., **139:** 325, 1943.

(10) Kim, M. S., and Ivy, A. C.: Am. J. Physiol., **105:** 220, 1933.

(11) Sacks, J., Ivy, A. C., Burgess, J. P., and Vandolah, J. E.: Am. J. Physiol., **101:** 331, 1932.

(12) Komarov, S. A.: See Babkin, B. P.: Secretory Mechanism of the Digestive Glands, Paul B. Hoeber, Inc., New York, 1944.

(13) Dragstedt, C. A., Gray, J. S., Lawton, A. H., and Ramirez de Arellano, M.: Proc. Soc. Exper. Biol. & Med., **43:** 26, 1940.

(14) Ivy, A. C., and Bachrach, W. H.: Am. J. Digest. Dis., **7:** 76, 1940.

(15) Tanturi, C. A., Ivy, A. C., and Greengard, H.: Am. J. Physiol., **120:** 336, 1937.

(16) Chiray, M., and Bolgert, M.: Presse Méd., **44:** 428, 1936; Chiray, M., Salmon, A. R., and Mercier, A.: Bull. et Mém. Soc. Méd. des Hôp. de Paris, **50:** 1417, 1926; Voegtlin, W. L., Greengard, H., and Ivy, A. C.: Am. J. Physiol., **110:** 198, 1934.

(17) Ågren, G., Lagerlöf, H., and Berglund, H.: Acta med. Scand., **90:** 224, 1936; Diamond, J. S., Siegel, S. A., Gall, M. B., and Karlen, S.: Am. J. Digest. Dis., **6:** 366, 1939; Diamond, J. S., and Siegel, S. A.: Ibid., **7:** 435, 1940; Comfort, M. W., and Osterberg, A. E.: Am. J. Digest. Dis., **8:** 337, 1941; Comfort, M. W., and Osterberg, A. E.: Arch. Int. Med., **66:** 688, 1940; Comfort, M. W., Osterberg, A. E., and Priestley, J. T.: Am. J. Digest. Dis., **10:** 7, 1943; Pollard, H. M., Miller, L., and Brewer, W. A.: Am. J. Digest. Dis., **9:** 68, 1942.

(18) Lagerlöf, H. O.: Pancreatic Function and Pancreatic Disease, Macmillan Co., New York, 1942.

(19) Popper, H. L., and Necheles, H.: Gastroenterology, **1:** 490, 1943.

(20) Phillipsborn, H. F., Jr., Lawrence, G., Gibson, S., and Greengard, H.: In press.

(21) Harper, A. A., and Raper, H. S.: J. Physiol., **102:** 115, 1943.

(22) Greengard, H., Grossman, M. I., Woolley, J. R., and Ivy, A. C.: Science, **99:** 350, 1944.

(23) Ivy, A. C., and Oldberg, E.: Am. J. Physiol., **86:** 599, 1928; Ivy, A. C.: Physiol. Rev., **14:** 1, 1934.

(24) Houssay, B. A., and Rubio, H. H.: Compt. rend. Soc. de Biol., **111:** 455, 1932.

(25) Sandblom, P.: Acta radiol., **14:** 249, 1933.

(26) Ågren, G.: Skand. Arch. Physiol., **81:** 234, 1939.

(27) Ivy, A. C., Drewyer, G. E., and Orndoff, B. H.: Endocrinology, **14:** 343, 1930.

(28) Smith, J. J., Pomaranc, M. M., and Ivy, A. C.: Am. J. Physiol., **132:** 129, 1941.

(29) Sussman, M. L.: Am. J. Roent. Rad. Therap., **38:** 867, 1937.

(30) Gerdes, M. M., and Boyden, E. A.: Surg. Gynec. and Obst., **66:** 145, 1938.

(31) Schaefer, W.: Fortschr. a. d. Geb. d. Roent., **47:** 42, 1933.

(32) Myers, G. S., and Hill, W. T.: Am. J. Physiol., **135:** 347, 1941–42.

(33) Greengard, H., Stein, I. F., Jr., and Ivy, A. C.: Am. J. Physiol., **134:** 733, 1941.

(34) Ivy, A. C., and Sandblom, P.: Ann. Int. Med., **8:** 115, 1934.

(35) Ivy, A. C.: Medicine, **11:** 345, 1932.

(36) Farrell, J. I., and Ivy, A. C.: Am. J. Physiol., **76:** 227, 1926.

(37) Feng, T. P., Hou, H. C., and Lim, R. K. S.: Chinese J. Physiol., **3:** 371, 1929.

(38) Quigley, J. P., Zettelman, H. J., and Ivy, A. C.: Am. J. Physiol., **108:** 643, 1934.

(39) Ivy, A. C.: In Glandular Physiology and Therapy, Am. Med. Asso., Chicago, 1942.
(40) Gray, J. S.: Am. J. Digest. Dis., **8**: 365, 1941.
(41) Sandweiss, D. J.: Gastroenterology, **1**: 965, 1943.
(42) Grossman, M. I., Greengard, H., Dutton, D. F., and Woolley, J. R.: Gastroenterology, **2**: 437, 1944.
(43) St. John, F. B., and Flood, C. A.: Ann. Surg., **110**: 37, 1939.
(44) Holland, A. L., and Logan, V. W.: Trans. Am. Therap. Soc., **41**: 86, 1941.
(45) Eusterman, G. B., and Balfour, D. C.: The Stomach and Duodenum, W. B. Saunders Co., 1935.
(46) Ivy, A. C.: Gastroenterology, **3**: 443, 1944.
(47) Fink, R. M., and Nasset, E. S.: Am. J. Physiol., **139**: 626, 1943.

John Bullus—Reading Physician and Naval Surgeon*

By JAMES F. GIBSON

Philadelphia, Pa.

THE year 1793 witnessed the most disastrous epidemic of Yellow Fever that Philadelphia has ever experienced. Everyone who could leave the city withdrew to the country, and President Washington with his cabinet transferred the seat of the government to Germantown. Tried preventive measures against the infection were ineffectual, and many exhausted medical men became victims of the fever. Dr. Benjamin Rush recorded that in one period of the pestilence only three physicians were well enough to attend to their practice, and that the pitiful appeals that were constantly received for attention to loved ones were heart-rending. Rush wrote that he often found a hundred frantic people assembled in his office, and that he sometimes made 150 calls a day and was frequently reduced to three hours sleep a night. Five of his apprentice assistants became ill with the fever and three died.[1] One of the two who recovered was John Conrad Otto, a grandson of Dr. Bodo Otto of Reading.

It was in this eventful year that British-born John Bullus of New Jersey entered Dr. Rush's office as an apprenticed medical student.[2] He was then too inexperienced to be of much help to his preceptor, except possibly in compounding constantly needed medicines. During the following three years, however, Bullus had many opportunities to assist Dr. Rush during the annual return of the yellow fever. He thus gained the confidence in himself that proved so effective when encountering his first difficult case at Reading.

Just what induced John Bullus to pick Reading as a place to start practice in early 1797 is unknown; but in the following letter, dated July 23rd, and addressed to Dr. Rush, he expressed a belief that the decision had been a mistake.

When I mentioned my intent of settling in Reading, you did not appear to like the selection, and suggested my going to the Southward. I now wish I had followed your advice for several reasons. While I am enjoying more business than I had any reason to expect, considering the short time I have been here, and have every reason to think it will rapidly increase, yet I do not believe that my income can exceed 300 pounds a year even if my practice employed me both day and night. A Barber in Philadelphia makes more than that by bleeding alone, and the reason for the low income possibility is obvious now, though unknown to me when I last saw you. It is this:—The number of Empirics [Quacks] that inhabit or infest this County for 20 miles around, is sixteen, and 2/3 of them will bleed for a six pence; ride a mile for the same sum, and give their attendance and advice gratis. They only charge for the medicine administered. I believe I have about 150 pounds due me on my books, but were I to charge the prevailing rates, it would only amount to possibly 70. From this account I am sure you will agree that it would be foolish for me to continue to trifle away the better part of my life in excessive toil and fatigue, just to obtain a mere living.

I am now determined to seek some place where I shall be paid for medicine, attendance and advice, and where a Physician receives a little more respect than is here shown a common laborer. Such a place might be found in Virginia; one of the Carolinas or possibly in some other Southern State, and the selection shall depend upon what you may think proper to give.

A few days ago I was called in consultation by three Empirics to see a woman in a case of as violent inflammatory fever as I have ever seen. I found her with all the symptoms of that disease—delirious—comatose—and with a depressed pulse—a combination which my professional brethren had never experienced before. She was also in the eighth month of pregnancy. In this situation I did not hesitate to spill a little human blood, which so startled the three men that they ran from the room;—went to the husband and begged him in God's name to dismiss me, that his wife's life might be saved, so I was discharged. They then administered a dose of opium and in a short time death was staring her in the face. I was immediately called back and when I found the three murderers also present, I informed the husband I would do nothing more until they were dismissed from the case, but they were finally allowed to remain on promises not to interfere with me. I then withdrew 30 ounces of blood, and gave an enema. Four hours later I took 25 more ounces of blood and this raised her pulse considerably, but she continued delirious and comatose; six hours

* Reprinted, by permission and with the addition of footnote references, from *The Historical Review of Berks County*, 1944, *9*, 73–77.

[1-4] Rush manuscripts. Ridgeway Library, Philadelphia.

afterwards I drew 25 additional ounces which produced some regularity in her pulse. I then applied a blister to her neck and ice to her head,—used the mercurial ointment and gave calomel. In the night we were all four hastily summoned to the patient, and I found her pulse had sunk, but I raised it again by bleeding off 30 more ounces which so exasperated the others that they left the house and reported I had killed the woman. Greatly to their astonishment, they learned the next morning that by reason of another bleeding I had given, the patient was quite out of danger and the mercury had begun to operate. Her coma and delirium had disappeared and once more she was able to converse with family and friends. Three days later when she was in a proper state of salivation, her labor began very naturally and with great ease. As it continued rather long, I thought it quite proper to accelerate matters by further treatments, so I bled her twice again, which fortunately for the preservation of my reputation, had the desired effect. I had no sooner bound up her arm than I delivered her of two fine boys, without any difficulty to her and with great ease to myself, as well as with scarcely any pain to my poor patient. She has since told me she had never experienced less difficulty in all the fourteen deliveries she had passed through, and should she have twenty more children, she would always be bled when in labor. My charge will not be more than ten or twelve dollars, though it ought to be three times as much. Since this experience I have been engaged by two women to attend them in their expected labor. You see Sir, I have not deserted the Lancet, nor will I ever relinquish it, but with my life.

My business is not very great at present but if I remain here, I shall eventually be busy, and it might be a season of importance to me. It is only now that I can properly apply that which I have learned, and your proximity would enable me to draw upon you for advice and information.

Fig. 1. Dr. John Bullus

Portrait by Gilbert Stuart, from *Salons Colonial and Republican* by Ann Hollingsworth Wharton (Lippincott, Philadelphia, 1900). With permission of the publishers.

A few lines from you by the next mail will be considered a great favor by your sincere friend and affectionate pupil.[3]

Dr. Rush was apparently much impressed with Dr. Bullus' bleeding recital, for he immediately replied, and under date of July 30, Dr. Bullus again wrote:

Upon receipt of your favor of yesterday, I rode to the home of the Karkner's to ask permission to publish the history of her case. Both were quite willing, but Mr. Karkner requested that if you published it in the newspapers, only their initials be used, though if it

Fig. 2. Instruments Used in Bleeding.

A cutting device with multiple knives (left) used in wet cupping; the blades were controlled by a spring and trigger. A large size spring lancet (right), with a blade controller, used for bleeding. From the Louis J. Livingood, M.D. collection, displayed at the Historical Society of Berks County.

were issued at some future time, I might write a lengthy account, and his wife, Ann, would sanction it by affixing her signature.

The only business I follow at present is that of preaching your theories and methods of bleeding with all the enthusiasm of a Methodist Minister, thereby converting a few of my professional brethren by withdrawing the veil from their eyes, and stimulating their minds with a little light and truth. I have so far succeeded too well, for instead of following the rules and directions of your bible of medicine, which I have put into their hands, they think to improve upon your practice, and are carrying it farther than even you have, by which they expect to rob you of that credit which is wholly yours. However, as is the case with all enthusiasts, they carry the practice to the greatest extent without first understanding the principles involved.

The town and country are uncommonly healthy at present. Harvest is about over and a period of mirth and hilarity will follow, but this will be an occasion of great excess in drinking, and that together with exposure and sudden climatic changes, will result in intestinal disorders and bilious fever, so I expect once more to unsheath my Lancet and spill some human blood.

I am most anxious to emigrate to one of the Southern States as soon as possible, so I shall continue to labor in a state of anxiety until you are pleased to favor me with your advice.

It was in August that the 1797 epidemic of yellow fever reached its greatest intensity, and again many Philadelphia physicians were among the victims of the disease. Rush's method of treating by bleeding and purging was bitterly attacked by a group of dissenting physicians, and the controversy was featured in the newspapers to the great confusion of the public. Bullus, learning that Dr. Rush was confined to his house by an attack of the fever, wrote under date of September 12, offering his services, and adding:

As I shall not receive my appointment for some time, I would rather wait in Philadelphia than in Reading, but be assured it is the first wish of my heart, particularly in this emergency, to render you every assistance that is in my power, so send me your answer as soon as possible.[4]

The French Revolution had passed through many phases by the fall of 1797, when John Bullus returned to Philadelphia from Reading and found the people greatly disturbed by a recent French declaration that any ship carrying English goods or sailing to or from a British port was a lawful prize. Communications from the West Indies began telling of American vessels overhauled and plundered—of sailors beaten and cargoes confiscated. With the hope of correcting these abuses, a commission was sent to Paris with an offer to negotiate a new treaty, only to be denied official recognition and refused an audience, but the commission was informed that if the American Government would present a goodly sum of money to certain members of the Directory, and offer a large loan to France, the negotiations might proceed. When this information was released in Philadelphia the American people united in a demand that the insult be resented with every action necessary to maintain the dignity of the United States. It was during the excitement of this national reaction that "Hail Columbia" was composed as a rallying song for the people. Congress then authorized a considerable increase in the Army and Navy with a resulting addition to existing personnel, and thus is was that John Bullus found a new field of activity.[5]

The forty-four gun frigate *United States*, one of six sister ships ordered built in 1795 to combat the Barbary Pirates, was still unfinished in the fall of 1797, and Captain John Barry, a friend of Dr. Rush, and senior officer in the American Navy, was then supervising her construction with the intention of taking command when she was launched. Captain Barry had expressed a determination to resist political pressure to accept inexperienced, newly commissioned officers for his flagship, and to carefully select men of proven merit and courage. George Gillasspy of New York had already been chosen as Surgeon when Rush solicited the position for Bullus, but the young doctor was promised the Surgeon Mate's commission when the frigate went into service.[6] The crew of the *United States* not having been mustered in, Dr. Gillasspy found time to attend Philadelphia's yellow fever patients, and eventually became ill. One of Captain Barry's biographers recorded:

The day Dr. Gillasspy was stricken with Yellow Fever, Surgeon Mate John Bullus appeared, and his administrations, plus the Doctors self treatments, robbed the plague of a victim whose exhausted condition might have made him an easy prey.[7]

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[5] McMaster, "History of the People of the United States."

[6] U. S. Navy Dept. "Quasi-war between the United States and France."

[7,8] Clark, W. B. "Gallant John Barry." Macmillan, 1938.

Many vexatious delays prevented the *United States* from sailing to join the fleet in the West Indies until July 7, 1798. The decision to depart was suddenly made, and Dr. Gillasspy, who was on leave, missed the boat. In expressing his disappointment to Captain Barry, the Doctor wrote: "You are fortunate in having on board (Dr. Bullus), as good a medical man as any in this fleet." Thus by a misfortune to his chief, John Bullus was given the entire responsibility for the health of a crew of over three hundred men.[8]

A journal kept by Lieutenant John Mullowney of the frigate *United States* recorded many incidents of the fleet's cruise in Southern waters. It told of French privateers chased, captured, or sunk, and of many merchant ships convoyed through dangerous areas; of patrols maintained between the coast of Florida and the French part of South America; of frequent visits to neutral harbors to obtain water and supplies; and of information regarding privateers believed present in the neighborhood. St. Christopher, the Barbadoes, Tobago, St. Pierre, Port Royal, Prince Ruppert bay, Carlisle, and even the French Island of Guadeloupe under flags of truce, were mentioned as ports of call. Hospitality extended by administrative officers on British Islands, as well as exchange visits with English Navy men were frequently recorded in Mullowney's journal.[9]

Under date of February 2, 1799, Captain Barry was directed to submit a list of fleet officers who merited promotion and on his recommendation John Bullus was commissioned a full Surgeon, July 20.[10]

The frigate *United States* returned to the Philadelphia Navy Yard for overhauling early in May, 1799, and on her arrival, the Secretary of the Navy wrote Captain Barry: "I think it will be best for you to discharge as many men as you can spare, for the quicker they spend their pay, the sooner they will be ready to re-enter the service." Therefore, on reaching port, John Bullus obtained a three months' leave of absence, and only reported for duty in time to sail with the frigate *Insurgente*.

The *Insurgente* had been a French warship of forty guns, manned by a crew of over four hundred men. She had been forced to strike her colors by the U. S. frigate *Constellation*, and this victory encouraged every officer and sailor of the American fleet to believe they could outsail and outfight any French man-of-war afloat. The *Constellation* had fewer guns and a smaller crew than her opponent, and stressing this fact, Captain Truxton persuaded the Admiralty Court to rule that the *Insurgente* might be sold for the exclusive benefit of the victor. The Secretary of the Navy paid $84,500 to the officers and crew of the *Constellation*, and after being repaired and refitted at Hampton Roads, the *Insurgente* was ordered to join the fleet under command of Capt. Alexander Murry. The latter on July 13, 1799, received a communication from the Secretary of the Navy, saying: "I will send you a Surgeon and a Surgeon Mate, but you may select all other officers yourself." Two weeks later, Murry reported: "I have a six months' supply of provisions for a crew of 300 men and expect to sail about Aug. 5th." His sailing orders stipulated: "The *Insurgente* is intended for a cruising ship and is not subject to any other command than your own. Your field of operation can be the West Indies; the Coast of South America, or anywhere you think French Cruisers may be found, but I want you to go wherever you please." Captain Murry reported sailing from Hampton Roads on August 9, with Dr. Bullus aboard, and expressed an intention of going to European waters and remaining as long as possible. Twenty-nine days later the *Insurgente* dropped anchor at Lisbon, Portugal, where the United States minister reported she was the first American warship to ever visit that port, and that the officers and crew had made a fine impression on the people. Captain Murry immediately continued the cruise, stopping at Cadiz, Gibraltar, the Madeiras and the Island of Teneriffe, and returned to the West Indies by way of French Guiana in hopes of contacting enemy warships. From the West Indies Captain Murry asked permission to return to some American port for much needed repairs, and wrote: "I regret to report having had a very sick crew since leaving Madeira, with the loss of six men. Twenty are still ill but upwards of 100 have been cured."[11]

The *Insurgente* reached Baltimore in early March 1800, and Captain Fletcher assumed command to oversee the overhauling. The old crew was discharged and the officers were given leave of absence. John Bullus was granted an unlimited leave, without pay, to engage in some business enterprise, but subject to recall at the pleasure of

[9-14] See footnote 6.

the Navy Department. This favor undoubtedly saved John Bullus from death, for on July 14, 1800, with officers re-assembled, the *Insurgente* sailed to join the fleet and was never heard of afterwards.[12]

Peace negotiations which began in the fall of 1800 were ratified in early 1801 and brought the three year, quasi-war with France to an end. Congress then ordered part of the fleet sold, some of the ships laid up, and a few kept in commission. The Navy personnel was also reduced to a skeleton organization, but John Bullus was one of fourteen surgeons retained. Three weeks after the Navy reorganization was in effect there was an unexpected renewal of Barbary Pirates' depredations on our merchantmen in the Mediterranean, and the fleet was called back into active service.[13]

John Bullus had been assigned to duty at the Washington Navy Yard, and he remained in that desirable post until 1807, when he was transferred to the State Department on his appointment as U. S. Consul to Marseilles, France. Meanwhile, during the fleet's activities, he was ordered "to prepare an assortment of medicines, instruments and necessary furniture to equip a thousand bed Lazaretta in the Mediterranean area;" and sometime later, "to remove the sick from the *Constellation* and to haul the *General Green* out into the stream to prevent communication between different ships, until the sick were restored to health."[14]

Dr. Bullus and his wife, a daughter of Colonel Charles Rumsey of Maryland, were socially prominent in Washington, the new capital. It has been written that once when Dr. Bullus attended a tea at Arlington without his wife, who was ill, he greatly admired the china, which his hostess explained had been inherited from General Washington. The following day Mrs. Custis wrote Mrs. Bullus expressing regret for her absence, and, buried in a basket of gooseberries which accompanied the note, Mrs. Bullus found one of the admired cups and saucers bearing the initials "G. W."[15]

Bullus' transfer to the State Department occurred in February 1807, and on his release by the Navy, he was informed that should he ever wish to return, his old commission in the Washington Navy Yard would be made available.[16]

In June of 1807 John Bullus with his wife and family sailed for his post at Marseilles, France, on the warship *Chesapeake*. Shortly after clearing the coast, the British man-of-war *Leopard* signalled the *Chesapeake* she was sending an officer aboard to deliver a message from the Admiral. The communication was a demand that Captain Barron assemble his crew on deck, that six suspected deserters from the British Navy might be identified and surrendered. On his refusal to comply, the British officer returned to his ship, and without notice the *Leopard* opened fire, dismantling the *Chesapeake's* masts and piercing the hull with twenty-one round shots. Bullus hurriedly placed his wife and children in a protected part of the *Chesapeake* and took a battle position on deck. Three American sailors were killed, and eighteen wounded, and the *Chesapeake* slowly made her way back to Hampton Roads to report the attack to Washington. The State Department immediately prepared an indignant protest, and chose John Bullus to convey the document to the American Commissioners in England. The communication contained a demand that the British Government disavow the action of the *Leopard*, and the right to search American ships for deserters; that the sailors taken from the *Chesapeake* be immediately returned; and that Admiral Berkley be recalled from American waters. All these demands were refused, although it was conceded that the British Navy had no right to stop and search United States warships, with an offer to pay for the damages suffered by the *Chesapeake*.[17]

On Bullus' return from London, he resigned his Consulate position to accept another government post at home. The Secretary's letter of appointment dated February 8, 1808, read: "Reposing special trust and confidence in your integrity and capacity, I hereby appoint you Navy Agent for the Port of New York."[18] There he became the intimate friend and hospitable host of many visiting naval officers and prominent men of that day. His residence was a spacious mansion at 69 Greenwich Street, where he gave lavish entertainments. A business venture with Stephen Decatur as a partner, in the production of gun powder for the war of 1812, was very successful, and it is on record

[15] Wharton, Anne Hollingsworth. "Salons Colonial and Republican." Phila., Lippincott, 1900.

[16,17] Records in Office of Naval Records and Library, Washington, D. C.

[18] National Archives, Washington, D. C.

that he subscribed $10,000.00 to the Government War Loan of 1813.[19]

John Bullus' determination to succeed was very evident in his youthful letters to Dr. Rush. With many powerful friends, a real ability, aided by good looks, a pleasant personality and a helpful wife, he attained his ambition. Two of his sons graduated from the Navy Academy and one rose to the rank of Commodore.[20] Bullus' death was evidently sudden and unexpected, for a letter he wrote three days before gave no intimation of ill health. Daily papers of New York, Philadelphia and Washington carried the announcement: "Died in New York City: John Bullus, Esq., Naval Agent, on Sept. 26, 1818, in the 43d year of his age."

[19] Guernsey, R. S. "New York City and Vicinity during the War of 1812–1815."

[20] Navy Register of the U. S. A. 1776–1887.

Letters from Professor Hyrtl Found in a Mütter Museum Scrapbook

By ELLA N. WADE

Curator of the Mütter Museum of the College of Physicians of Philadelphia

SINCE 1863, when Dr. Thomas Dent Mütter's collection and the collection of the College of Physicians, begun in 1849 by Dr. Isaac Parrish, were joined to become the present Mütter Museum, there have been many valuable purchases and contributions, but to no one is the Mütter Museum any more indebted than to Professor Joseph Hyrtl who, in 1874, sold to it the greater part of his rare collection.

Professor Hyrtl was born December 17, 1811 at Eisenstadt, Hungary. He studied at Vienna, where at the age of twenty he obtained the position of Preparator. In 1837 he was chosen Professor of Anatomy in the University of Prague, and in 1845 returned to Vienna as the Professor of Anatomy at the University there. It is said that he was the most popular and fascinating lecturer in Europe and an excellent teacher and technician, exceptionally skillful in the art of preparing anatomical specimens.

Dr. Thomas Hewson Bache was the curator of the Mütter Museum from 1865 to 1884. In this capacity it was his privilege to meet and know Professor Hyrtl, and it is through a few old letters preserved in the Museum files, which he wrote to Doctor Bache over a period of eight years, that we become acquainted with him and his work, and learn how the Mütter Museum came into possession of a great many of its interesting and unusual exhibits.

It is probable that few of the Fellows of the College ever have seen these letters or, in fact, know of their existence. They are well worth reading.

We are told that in 1874 Professor Hyrtl resigned his chair, in order, by his own admission, to escape the humiliating experience of being pensioned off at seventy. He evidently anticipated this in 1866, for it was at that time that Doctor Bache received the first letter from him which appears in our scrapbook. It reads:

"Vienna, Feb. 26, 1866.

Honoured Sir:—

I have the honour to inform you, that my collection of Organs of Hearing, consisting of 315 objects, cannot be divided, so as to sell the human preparations separately. The value and the scientific interest of this collection consists even in the exhibition of the changes which undergoes the strange form of an organ from man down to the lower animals.

"I would never have thought to part with a collection which has been the pride and ornament of my private museum, since the English (in the exhibition 1862) styled it "*admirable.*" But I think to leave my chair and to retire to the country, where an anatomical collection is a kind of burden.

"The prize for the whole is 35 flor. (2 flor. equal 1 dollar) packing included. There is no similar collection. You may think, on perusing the names of animals, whose organs of hearing I have prepared, that things so rare and precious, are not easily to be got a second time. If the College of Physicians in Philadelphia should think proper to purchase the collection, I can send it without delay, and carefully packed, so that damages are out of possibility. The payment is quite at the commodity of the purchasers. Every physician in London, who certainly saw the things in 1862 may bear testimony of their perfection. The fishes and reptiles of the same catalog are also to be disposed of.

Yours very respectfully
Prof. Jos. Hyrtl."

This particular collection required fourteen years of preparation and consists of two rosewood cases, which are exhibited in the main room of the Museum. One of these contains the labyrinths of the ear of man and all mammalian families. Professor Hyrtl says of these, "the contents of this case lay claim to morphological value alone. Whatever functional differences are conditioned by the changes in the form of the labyrinth, we cannot now even guess, and shall also not learn anything more concerning them to all eternity."

These preparations were obtained by the use of corrosion because of the hardness of the bones of

the skull in which the labyrinth is buried. Any other method would have damaged the specimens.

The second case contains the chains of ossicles of the ear from all kinds of vertebrate animals.

It is strange that after this letter there seems to have been no further correspondence between Professor Hyrtl and Doctor Bache until October 1873, when Doctor Bache received a second letter. In this Professor Hyrtl lists the preparations which he desires to sell. He mentions the collection of skulls of many nations, organs of hearing of man and all mammalian families, corrosional preparations, which he suitably calls "the flowers of technical Anatomy," and a collection of microscopic injections.

The skulls to which he refers, is a collection of crania of different races of man, about half of which show different varieties and peculiarities. This exhibit is seen immediately one enters the Museum. Every skull bears the name of the person, the birthplace, age, religion, occupation, and in most cases the cause of death. These inscriptions make rather gruesome reading as there are many suicides, and hanged or beheaded murderers among them. It is interesting to know that every skull, at the time of purchase, possessed complete teeth. Instructions on the unpacking of these specimens cautioned one to remove each skull carefully from its separate envelope and look through it for teeth which may have fallen out.

The records of the purchase and shipment of these 139 skulls belie the story that seems to have been handed down, through the years, from one curator or technician to another, that the skulls had been exhibited in this country and later were given or sold to the Mütter Museum for a very low price by Professor Hyrtl, who did not wish the care of packing and shipping them back to Vienna. There seems to be no foundation for this story, and its origin is a mystery. The skulls, evidently, made their first journey to America when they were purchased by Doctor Bache.

Professor Hyrtl says of this collection: "it is easier to get the skulls of Islanders of the Pacific, than those of Moslim, Jews, and all the semisavage tribes of the Balkan and Karpathian valleys. Risking his life, the gravestealer must be largely bribed. My pupils, who are physicians to the Turkish Pachas, procured most of them for me."

He concluded this letter with the following: "I shall feel very happy, if my anat. treasures, or part of them, should find a hospitable roof in a great scientific establishment, instead of being dispersed in various universities. The prizes are in correspondence to the value of the objects. If you will give orders, they shall be strictly executed by Your obedient servant

Prof. Jos. Hyrtl."

In December Doctor Bache, having acquainted Professor Hyrtl with his plans to visit Europe in the interest of the Museum, received the following letter from him:

"Vienna, Dec. 23, 1873.

Dear Sir—

I received your last letter (Dec. 4th) yesterday, and I give immediate answer to it. I reckon, after your plan of journey, that you will reach Vienna towards the end of March or the beginning of April. At that time I shall be absent from Vienna. I have purchased an old tower of a dilapidated medieval castel (near Vienna—¾ of an hour) where I fix my lodging after having retired from my chair, which I held through 37 years. My wife will be certainly in Vienna at the mentioned time, together with my assistant Dr. Friedlowsky, Prosector to my anatom. chair. You will find them at my lodging in Vienna: Alservorssadt, Währingergasse, No. 1. Dr. Friedlowsky will show you my preparaions, so give me notice of your arrival, that I may have the pleasure of seeing you and transact our business personally. Part of my collection is already in my old tower.

"It would be very welcome to me to know, what objects you will *certainly not take.* I have offers from Berlin and Leyden. I answered them, that a transaction is pending with America, and that they may have what is not accepted by you and your Museum. You are *by no means engaged or bound* to settle the bargain, before you have convinced yourself by ocular inspection, what will suit the wants of your Museum. I wish that you would consider this request as a *matter of probability*, so that I could give to my friends some dilatory answer.

"I wish you heartily a good and pleasant voyage across the Ocean and remain

Your
devoted servant
Jos. Hyrtl"

The curator arrived in Europe to consummate the transaction with Professor Hyrtl earlier than

was expected, for the next letter to appear in the Museum records reads:

"Perchtoldsdorf, near Vienna
Feb. 2, 1874

Honoured Sir.

I see by your letter (January 27th) that you are safely arrived in Europe. I think, that crossing the Ocean in winter-time, must be very perilous. Sea-sickness and the remembrance of all the terrible stories of fire and shipwreck, are disagreeable companions on such a voyage, which I would never undertake by my free will. Now all danger is past for you, and you will enjoy your sojourn under the mild Italian sky.

"On your arrival in Vienna, you will find the preparations put up for closer inspection. I am sorry that you did not mention the tableaux of fish and reptile-skeletons. They are models of anat. workmanship.

My assistant Dr. Friedlowsky will give me notice of your arrival in Vienna, so that I may have the honour, to make your personal acquaintance. Meanwhile,

Your respectfully devoted
J. Hyrtl."

Doctor Bache met Professor Hyrtl and Doctor Friedlowsky and viewed and selected what he desired for the Museum, and on April 21, 1874, at Gaaden, near Vienna, the two men signed an agreement, which was witnessed by Doctor Friedlowsky. Following an itemized list of selected collections, the agreement reads, "... for the sum of Six thousand four hundred and ten Prussian thalers, (Th 6,410.) Dr. Bache of the second part engaging to pay on signing of this agreement One thousand Prussian thalers (Th 1000.) on account and the rest or remainder of the said Th 6410. Prussian thalers on the arrival of the above indicated preparations safely in America.

"Furthermore, Prof. Hyrtl agrees to bear all the expense of packing the above mentioned preparations and insuring the same for their full value, the expense of said insurance *only* to be refunded by the said Dr. Bache of the second part to the above mentioned Prof. Hyrtl of the first part.

"Should any of the said above mentioned preparations on arriving in Phila. be injured or destroyed the said Prof. Hyrtl for himself his heirs and assigns engages to deduct the amount charged for said preparations.

Witness
Dr. A. Friedlowsky
Gaaden near Vienna
April 21th, 1874"

Prof. Dr. J. Hyrtl
Thos. Hewson Bache
curator Mütter Museum

I shall not attempt to transcribe a letter written to Doctor Bache in June, 1874 by Doctor Friedlowsky, since it is impossible to decipher it exactly. It is merely a notification of the shipment of the preparations, with detailed instructions on the way in which they should be unpacked.

Several days later Professor Hyrtl wrote the following letter to Doctor Bache. The description of the method of transporting the treasures to the steamer to insure their safety is most interesting.

"Perchtoldsdorf, near Vienna
June 24th

Dear Sir.

When this letter comes to your hands, the preparations will be on their way to Philadelphia, or perhaps already in your city. Every care has been taken to procure a safe transport. From Vienna to Antwerp I am sure that no damage can take place. The Inspector of the railway to Antwerp, had the kindness, to give the strictest orders to the conducteur of the train, that no attention should be spared. I and my friend Dr. Friedlowsky were present, when the cases were put on the waggon. Every case was seated on a pillow, and the whole company of them was surrounded with railings. To avoid dangerous unloading on the frontier of Germany, we sent the cases not with the ordinary, but with the post-train, by which necessary measures the cost of transport will be augmented by a few dollars. We have also written to your agent in Antwerp, informed him of the day when the train will be in that city, and begged him to do all he can, for a careful transfer of the cases to the steamer.

"So I dare hope, that all will end with mutual satisfaction. Do me the favour to remind me occasionally to my friends in Philadelphia: Prof. Henry and Dr. Chapman. I wish you happiness, success & health for all your life, and will never cease to be

Your devoted friend
Prof. Jos. Hyrtl

Perchtoldsdorf, near Vienna,
Südbahn"

The next items of interest are a letter and a receipt. The latter was written by Doctor Bache, signed by Professor Hyrtl and returned. It reads:

"Form of Receipt to be signed and returned to Dr. Bache. Received from Dr. J. Rodman Paul, Chairman of Mütter Museum Committee of College of Physicians *Six* thousand four hundred and ten Prussian Thalers, in full, for anatomical preparations bought by Dr. Bache, Curator, for the Museum.

Sign here Professor Jos. Hyrtl

6410. Pr. Th:

Vienna, August 24th.
1874"

The letter accompanying this receipt gives instructions on the repair of some damaged corrosional specimens and on the care of them.

"Perchtoldsdorf near Vienna,
Aug. 24th, 874

My dear Sir.

I am happy to inform you, that all your orders contained in your honored letter of July 22th, have been duly executed.—The Anglo-Austria-Bank paid to me the sum of 825£. St.—The letter of credit from the Mrs. Brown Shippley & C. has been signed by me, & sent back to the said Firm.—The form of Receipt, you were so kind to write for me, is also signed by my hand, and is enclosed in the present letter.

"The little damages, which you have mentioned, can be easily repaired. A very little bit of *thick* varnish (density of thick honey) is brought on the two ends of the fracture. The branch, which went off, is brought in contact with the trunk, and sticks to it by the sensity of the varnish. Then you may touch the point of reunion with a hot needle, so that the varnish can melt together with the wax and resin of the corroded vessels, which will keep as firm, as if no fracture had taken place.

"I beg, not to expose the preparations to the heat of a furnace, nor to the direct rays of a fiery sun, for a long time. The red, blue & yellow colour will never change, but the *green* colour will lose freshness under the influence of an ardent sun.

"I thank you heartily for all the kindness you had for me in this business. If I can be of some use to you in whatever respect here in Vienna, it shall afford me the greatest pleasure, and if the Museum of the Academy of N. Sc. in Philadelphia should think convenient, to buy the 8 Tableaux of Ganoid fish and Reptiles,* which were as much admired at the Exhibition as the Corrosions, I shall make a very reasonable price. There are Unica in them. The village, where I retire, is not a spot for such things, which should be taken care of, after my Death, as masterpieces of anatomical workmanship.

"I shake your friendly hand in farewell, and remain

Dear Sir
Your very obliged
Jos. Hyrtl

*Skeletons. Notice of them in the Description of my exposition."

This is the last letter from Professor Hyrtl in the Museum scrapbook, and with the exception of the microscopic injections, which are packed away in the storeroom, the collections with which these letters deal, still occupy prominent places in the rooms of the Mütter Museum. Some teeth, we are sorry to say, have disappeared from the collection of skulls, and a crack has developed in the mount containing the labyrinths of the ear of man and mammalian families, presumably caused by changes of temperature. All but about a half dozen of the glass-covered corrosional preparations are on view, still bright in color, so we must have heeded Professor Hyrtl's warning and not exposed them to an "ardent sun." It is remarkable, also, that except in a few cases, the wax used in their preparation has not been affected by heat.

Professor Hyrtl, I feel sure, would not regret that he allowed his anatomical treasures to become a part of the Mütter Museum, where, among other valuable anatomical and pathological exhibits they continue to contribute a share to the history of medicine.

Memoir of William Osler Abbott*

By WILLIAM C. STADIE

WILLIAM OSLER ABBOTT, a Fellow of this College since 1934, was born in New Bedford, Massachusetts, July 26th, 1902, and died at Waquoit, Massachusetts, on September 10th, 1943, at the age of 41. Shortly after being mustered in as major in the 20th General Hospital, while at Camp Claiborne, Louisiana, he became aware of the tragic fact that he had myelogenous leukemia. With quiet courage he accepted his honorable discharge from the army, and with characteristic vigor and earnestness he plunged into a new and final activity—that of a study of the disease which had afflicted him. To this end he associated himself with the Memorial Hospital group in New York City, which, under the leadership of Dr. Cornelius P. Rhoads was making important contributions to the study of neoplasms. He died while still actively engaged in this research.

His father was the late Dr. Alexander C. Abbott, professor of Bacteriology and Public Health and Hygiene at the University of Pennsylvania. His mother was Georgina Osler, a niece of Sir William Osler. But with characteristic modesty this relation to Sir William was never referred to by Dr. Abbott.

In 1928 he married Lucy Waldo of Kansas City, Mo. His wife and three children, Thomas William Osler, Ann Gatewood, and Lucy Featherstone survive him.

Dr. Abbott received his A.B. in 1925 and his M.D. in 1928 from the University of Pennsylvania. At the University Medical School and the Hospital he became in turn Medical Fellow (1930–1931), Instructor (1931–1937), Associate (1937–1941), and Assistant Professor from 1941. From 1931–34 he was associated with the Department of Pharmacology where, under the guidance of Dr. A. N. Richards, he received the incentive and training which was later to prove invaluable in his gastroenterological researches.

Dr. Abbott's most significant contributions to medical science were in Gastroenterology. Shortly after completing his internship, his interests became focused in that field. His enthusiasm and diligence resulted in significant contributions to manifold problems and won for him recognition as an outstanding internist.

In 1941 he was made Assistant Professor in the Gastrointestinal Section of the Medical Clinic of the University Hospital. With Dr. T. Grier Miller, Chief of that Clinic, he developed and perfected the technique and clinical application of the Miller-Abbott tube which has won such widespread recognition as a highly important aid in the study and treatment of gastrointestinal disorders. In association with Dr. Charles G. Johnson he demonstrated its dramatic efficacy in patients with bowel obstruction.

But these important medical advances should not obscure his equally significant contributions to many aspects of the physiology of the human gastrointestinal tract. His published researches comprised some forty papers, most of which were devoted to his chosen field.

The medical profession recognized his eminence in many ways. He was a member of the American Society for Clinical Investigation, the Association of American Physicians—a recognition of his outstanding accomplishments as an internist. In addition he was a member of the American Clinical and Climatological Association, the American Gastroenterological Association, American Medical Association, the Pathological Society of Philadelphia, the Philadelphia Physiological Society, and the Charaka Club of New York. He was largely responsible for the success of a combined "Exhibit on the Small Intestine," which, in 1935, received a "Special Certificate of Honor" from the American Medical Association, the "First Award" of the Radiological Society of North America, and the "Gold Medal" of the American Roentgen Ray Society. Dr. Abbott was also active in the affairs of this College. He was chairman and member of the Publication Committee (1940–1942)and Member of the Council (1940–41).

It is difficult in a brief biography to convey the full flavor of the warm, genial, and stimulating character of Dr. Abbott, which so endeared him to his friends. He led the simple quiet life of a man devoted to family and profession. He abhorred pretense and indirection. To be his friend was a

* Read at the meeting of the College of Physicians of Philadelphia, October 4, 1944.

privilege and a delight, for an evening with him before the fire promised whimsical anecdote, philosophy, science, medicine, and absorbing comment no matter where the conversation drifted. He loved Nature, and frequently illuminated conversation with entertaining recitals from his fund of natural lore. He was an expert fly-fisherman, and also an enthusiastic skipper of small sailing craft. His sea-going forebears stimulated in him a keen interest in nautical science, and he accumulated a comprehensive library and other memorabilia in this field.

But above all he possessed courage. With the sentence of death upon him, he went about his work quietly, efficiently, and devotedly, abhorring pity. The memory of him will ever linger with his many friends as an inspiration and example of devotion to duty to the very end.

Memoir of Charles Walts Burr*

By FREDERIC H. LEAVITT

DR. BURR'S life, activities, and ambitions were so intimately a part of the College of Physicians of Philadelphia, that it seems quite fitting that a memoir of him should be read in Mitchell Hall of this College. His love of books centered to a great degree upon the Library of this College and the Library of the University of Pennsylvania. His long association with Dr. S. Weir Mitchell has been reflected in many ways by his activities in these halls.

On February 19, 1944, Charles Walts Burr passed away in his apartment at The Drake Hotel in Philadelphia in his 84th year. His death had been expected by reason of the known nature of his illness, but to his host of friends and associates it occasioned great sorrow. His had been a most versatile personality. He was a man of medicine, of science and of letters. He was more than a physician; he was a teacher, an investigator and an author of no mean caliber. He belonged to that generation of nationally known Philadelphia neuropsychiatrists who had added lustre to their specialty for many years and he was the last survivor of the Dercum, Mills, Lloyd and Spiller group. It has been said of him that he did not know how to play; but no one ever had any doubt that he knew how to think and to work. In my many years' acquaintance with him I am certain that he never took a vacation of more than a few days at a time, and aside from his studies in Europe immediately following his graduation from the medical school of the University of Pennsylvania, he had never traveled extensively. His entire life was devoted to a continual search for knowledge, not only in medicine but in many other fields. Dr. Burr never married, principally because such a course would have militated against his main objective in life—the unimpeded pursuit of knowledge. It may indeed be said that he was married to his art.

He was a firm believer in the importance of heredity in the predisposition to disease, and this was emphasised in one of his most interesting monographs entitled, "What is a Good Environment?" He also was a proponent of the organic cause of mental and nervous disorders and was opposed to the more radical phases of the doctrine of psychoanalysis. He prophesied the ascendency of chemotherapy as has recently come to pass through the miracles of penicillin and the "sulfa" drugs.

Dr. Burr had frequently stated to me that his life had been uneventful,—no tragedy, but quite a little comedy in the classical meaning of the word, had come into it. He stated that his ancestors were unimportant, simple, thrifty and God-fearing, honest people. On his father's side they were English Quakers who had settled in New Jersey before the Revolution. His mother's people were Irish Presbyterians named Walts. Aaron Burr was not of Dr. Burr's kin. Charles W. Burr was born in Philadelphia November 16, 1861, and was the youngest of four children, all sons.

There was a general opinion among those who knew him that he adhered to no religious belief, and by some he was even considered as an atheist. Dr. Burr was a profound believer in an Omnipotent Being, but he adhered to no special religious tenets, and he had no time for the bickerings and theological squabblings that in his personal experience and reading had demonstrated to him the frailty of religious dogma. This attitude had its origin in an episode in his early life, due primarily to a difference in the religious beliefs of his parents. Up to ten years of age he had gone regularly to Sunday School at the Arch Street Presbyterian Church. One Sunday his regular Sunday School teacher was ill and his place was taken by an unwise young student of theology who preached a sermon to the young class on the necessity of baptism in order to obtain salvation. This preacher stated that the unbaptised would be "damned." At this juncture the young Charles Burr, age 10 years, arose in his wrath and remarked: "That is a lie; my father is a Quaker; he has never been baptised, but he will go to heaven as soon as he dies." Whereupon he left the church, and from that day never entered another church nor evinced any interest in sectarian religious belief. This incident is an excellent example of how a childhood impression could and did influence the conduct and belief of a person throughout his lifetime.

Dr. Burr was a graduate of the University of Pennsylvania, in arts in 1883 and medicine in 1886. He was a college honor graduate and was elected "spoon man" of his class. Shortly after gradua-

* Read at the meeting of the College of Physicians of Philadelphia, October 4, 1944.

tion he joined the staff of the Philadelphia General Hospital and became assistant to Dr. S. Weir Mitchell. He was also associated with Dr. Wharton Sinkler and Dr. William Osler at the Orthopaedic Hospital and a little later he studied neurology and psychiatry abroad for two years. Shortly after his return to Philadelphia he became a teacher at Medico-Chi Hospital and College, and eventually professor of neurology at that institution. In 1901 he accepted the chair of psychiatry at the University of Pennsylvania under-graduate school of medicine, which chair he occupied for thirty years, being retired "on age" in 1930. He was consultant in neuropsychiatry to many hospitals in and about Philadelphia; and during the first World War was psychiatric consultant to the Surgeon General of the U. S. Army. Dr. Burr was recognized as one of the great leaders in American neuropsychiatry, and in 1908 he was elected president of the American Neurological Association. He also had been president of the Philadelphia Neurological Society, and of the Pathological Society in 1898. He also founded and was twice president of the Philadelphia Psychiatric Society.

During his life he had collected a large library of scientific books, and in 1929 he presented 19,000 volumes to the University of Pennsylvania. At about that time he was made president of the board of trustees of the Episcopal Academy and in 1933 was awarded the degree of "Doctor of Science" by the University of Pennsylvania and was appointed to their board of trustees. He was also a recipient of the Strittmatter Medal "for meritorious achievements in the field of medicine" in Philadelphia.

In 1915 Dr. Burr edited and contributed a chapter to "The Textbook on Nervous Diseases" by Hans Curschmann. As an avocation, Dr. Burr was interested in the psychopathology of "Genius" and a large section of his library dealt with men and women of exceptional ability. He disapproved very strongly of "mass education," believing that nature did not intend all human beings to have a so-called "higher education;" and this thought was expressed in many monographs, one of which was the widely discussed "Broken Minds of Youth."

Dr. Burr was interested in many things other than medicine. He was an active worker in, and at one time president of, The Dickens Fellowship of Philadelphia the Philosophical Society and the Franklin Inn Club.

In 1926 he was elected president of the National Eugenics Research Society, and his presidential address was entitled, "The Evils of Standardized Education." He also was president of the Numismatic and Antiquarian Society of Philadelphia and of the Medical Club. One of his chief joys was in attending the meetings of the Philobiblon Club. He was instrumental in organizing at the University of Pennsylvania the society known as "The Friends of the Library," the purpose of which was to foster interest in and obtain funds for that library. For many years he had been Honorary Librarian of the College of Physicians of Philadelphia.

During his lifetime, Dr. Burr amassed a considerable fortune both in money and in a remarkable library of manuscripts, rare papers and rare books. He was keenly interested in young men who showed promise of special intellectual ability, and in many instances he subsidized the further education of such youths who were financially handicapped. This occurred frequently with students at the University of Pennsylvania, his internes in hospitals and at other institutions in the vicinity of Philadelphia. Dr. Burr might have been likened to "Mr. Chips" in that he had made himself a father to many sons in guiding their youthful footsteps and mental leanings, despite the celibacy of his own life.

Dr. Burr was peculiarly alone during the last 20 years of his life. He had absolutely no direct or even collateral relatives. None of his brothers had married and he was the last survivor of a really brilliant family line.

Dr. Burr took keen delight in studying and analyzing the mental processes of great authors and personalities in history. His monographs on "Galen," "Jean Paul Marat," "Robert Blake—The Mad Poet," "Dr. James and his Medical Dictionary," "Jerome Cardan as Seen by an Alienist," are a few of his writings of this nature which have intrigued many audiences at various medical meetings.

In the words of John Dryden, Dr. Burr's philosophy of learning could have been summarized as—

"Errours like straws upon the surface flow
But he who would reach for pearls
Must dive below."

He did indeed search "below the surface" for the answer to the riddle of life. Opinions will vary as to whether his was a complete and well-rounded existence, but there is no doubt the world is a better and more enlightened place in which to live because of the achievements and teachings of Charles Walts Burr.

Memoir of Randle C. Rosenberger*

By FRANK CROZER KNOWLES

RANDLE C. ROSENBERGER was born in Philadelphia on March 4th, 1873. His parents, Levi A. and Amanda (Crater) Rosenberger were descendants of the early Dutch settlers of Germantown.

He received his early education in the elementary schools and the Central High School of Philadelphia. Registration was made at the Jefferson Medical College and three years later, in 1894, he was graduated. His preparatory college training was received from the late Dr. William R. Claridge and tutelage in laboratory work was under the supervision of the late Dr. M. L. Coplin.

There was never a break in Dr. Rosenberger's connection with Jefferson Medical College from his entrance as a student until the day of his death, February 21, 1944.

The year of his graduation in 1894, he became Assistant-Demonstrator of Histology under Dr. Charles S. Hearne and assistant in the Out-patient Children's Department under Professor E. E. Graham. A year later, an assistantship in Diseases of the Heart and Lungs, at the Philadelphia Polyclinic, under Professor Mays, was added to his duties.

Because of his interest in the tubercle bacillus he became Pathologist to the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis. For many years, 1903 to 1919, he was Director of the Clinical Laboratories at the Philadelphia General Hospital. Teaching at the Woman's Medical College of Pennsylvania occupied his attention from 1909 to 1915, starting as Lecturer on Hygiene and subsequently as Professor of Preventive Medicine. During all of this period his activity at Jefferson continued. In 1897 he became Demonstrator of Morbid Anatomy and Bacteriology. A year later, Assistant Pathologist to the Jefferson Hospital and Curator of the Jefferson College Museum. Advancing through the customary grades, in 1904 he became Assistant Professor of Bacteriology and five years later, March 29th 1909, Professor of Preventive Medicine and Bacteriology. The position of Curator of the College Museum was resigned in 1910. The title of his Professorship was changed in 1941 to Bacteriology and Immunology.

The honorary Degree of Doctor of Science was bestowed on Dr. Rosenberger by the Philadelphia College of Pharmacy on May 27th, 1942.

He was a member of the College of Physicians of Philadelphia; Philadelphia County Medical Society; Pennsylvania State Medical Society; American Medical Association; Fellow of the American Public Health Association; Society of American Bacteriologists; Pathological Society; International Association of Medical Museums; Charter Member of the Nu Sigma Nu Fraternity; Honorary member of the Society of Ex-Residents of St. Joseph's Hospital; Delaware County Medical Society; Aesculapian Club and Medical Club.

Assisting the welfare of the City of Philadelphia, he served on the Milk Commission, Pneumonia Commission, and Chairman for the Study of Poliomyelitis and Encephalitis.

He was active in the affairs of the Pennsylvania German Society and held life membership in the Cannstatter Volkfest Verein.

Dr. Rosenberger was a prolific writer and sixty-six personal papers were listed in his bibliographic index. In investigative work his great love was the tubercle bacillus, over one-half of his publications dealt with various phases of this organism.

His many papers covered a span of forty-two years. He collaborated in several of these with outstanding Surgeons, Internists and others in special fields.

One of his earliest publications, in 1900, was in association with Dr. W. W. Keen and dealt with the "Surgical Use of Celluloid Thread."

As far back as 1901, in collaboration with Dr. DaCosta, a paper appeared on "Eosinophilia in a Case of Trichiniasis."

An interesting study, in association with Dr. S. Solis Cohen was made in 1904, "Case of Splenomegaly with Blood changes and Symptoms resembling those of Banti's Disease, apparently due to Malaria."

Elaboration of old and also new staining methods for various micro-organisms were recorded in several published researches. "Preservative Solu-

* Read at the meeting of the College of Physicians of Philadelphia, December 6, 1944.

tions for Gross Specimens" was stressed on various occasions.

Several papers were published on "The Identification of the Colon Bacillus by Reactions Produced on Culture Media containing Neutral Red" and "Hyaline Bodies in Tumors and Kindred other Conditions."

Oral Sepsis, particularly Vincent's Angina was carefully investigated.

That horrible sequella of Measles, Noma was bacteriologically studied and the findings appeared in two contributions.

Various studies with publications were made on "Serum Sickness"; "Acute Lymphatic Leukemia"; "Typhoid Carriers"; "Bacterial Studies of Smegma"; "Purulent Cerebrospinal Meningitis caused by the Typhoid Bacillus"; "Intestinal Parasites in Inmates of the Philadelphia General Hospital" and "Typhoid Osteomyelitis successfully treated with a Vaccine."

Two papers whould be mentioned on "Amebae in the Stools of apparently Healthy Individuals" and "Amebiasis and the Results of Tests for the Determination of Occult Blood in the Feces."

A study was also made of "Filariasis Associated with Schistosomiasis".

Dr. Rosenberger was always interested in dietetics and three investigations were carried out on various foods. The first was "A Study of Eggs offered for Sale as Pure Food"; the second, "On the Presence of Bacteria in Fresh Eggs"; and the third, "A Bacteriological Study of Ripe Olives."

Several important investigations and publications were made on Syphilis. Within a year after Schaudinn and Hoffmann had made their epic discovery of the cause of Syphilis in 1905, Rosenberger wrote on the "Spirochaets Found in Syphilis." Two years later, the latter after an exhaustive study published his findings on the "Biology of the Spirochaeta Pallida." At a considerably later period a paper was published, "A Series of Studies for Recognition and Diagnosis of the Treponema Pallidum."

Two other contributions were made on laboratory investigations in Syphilis, the first, "Summary of Wassermann Tests Done During 1916, in the Philadelphia General Hospital", and the second, "Ten Thousand Wassermann Tests."

To those of us addicted to that deadly weed, tobacco, "A Bacteriological Study of Cigars" would prove of interest.

From the trade point of view, Dr. Rosenberger's two contributions are illuminating, one, "A Bacteriological Study of Cutting Oils Causing Skin Lesions" and, two, "Tanners Ulcer". The latter in collaboration with Dr. J. Chalmers Da Costa.

His last scientific publication appeared in 1942, "A case of Cutaneous Myiasis Due to the Larvae of Cordylobia Anthropophaga."

A beautiful tribute was paid to Dr. Rosenberger when his photograph appeared on the cover of the Jefferson Alumni Banquet Menu. This gathering was held January fifth of the present year and the entire affair was a gesture to fifty years of active service at his Alma Mater.

As senior member of the Major Faculty and Chairman of the same, on several occasions Dr. Rosenberger acted as Dean or presided at important functions when the Medical Head at Jefferson was ill.

September 25th, 1899, Dr. Rosenberger married Etta P. Scheck. She died in 1926. His second wife was Sallie Slifer, whom he married June 9th, 1930 and who survives him.

Probably I have known Dr. Rosenberger longer than anyone else in the Jefferson Faculty. In the old Blockley days, long before the last war I would frequently see him when he was in charge of the Clinical Laboratories and I an Instructor in Dermatology.

A lover of the great outdoors, membership was maintained in the Academy of Natural Sciences; the American Museum of Natural History; the Zoological Society of Philadelphia, and the Audubon Society.

Nineteen years ago he built his home at Rahns, three miles from Collegeville, Pennsylvania. The house of a bungalow type was situated on a hillside, with beautiful old shade trees, a lovely old-fashioned flower garden, and close to Perkiomen Creek.

This was indeed an ideal retreat for the older years of his life. In the room, used as a study on the second floor, he would keep up to date on medical literature or could dream of the Old Masters in the realm of music. The latter was really his great indoor hobby and he rarely missed the Friday afternoon concert of the Philadelphia Orchestra.

Frequently he drove around the beautiful rolling country with his horse and buggy.

The beauties of nature were shared with others, for each year, the undergraduate members of the Nu Sigma Nu Fraternity were invited for a week end and base ball was one of the features indulged in by all.

Dr. Rosenberger had a remarkable faculty of remembering faces, names and incidents in the lives of hundreds of individuals. There were very few graduates from the Jefferson Medical College, who returning to their Alma Mater even after many years of absence, would not be called by name on visiting Dr. Rosenberger.

He was "hail fellow well met" with everyone no matter what their position in life. This was well exemplified by the Cashier at a restaurant close to Jefferson who said a few days after Dr. Rosenberger's death, "he always had a good word, a smile and a laugh for everyone of us."

Ending one of my lecture hours, in paying a short tribute to Dr. Rosenberger, I said to the students, you and I have lost one of our best friends.

Memoir of John Borneman Ludy

By EDWARD F. CORSON

JOHN BORNEMAN LUDY was born August 30, 1880, at Boyertown, Pa. His ancestors in this country were Pennsylvania Germans—his father a Civil War veteran. His forebears were of sturdy stock with an unexpressed but innate patriotism which directed the current of Dr. Ludy's life.

In 1902 he was graduated A.B. from Franklin and Marshall College, Lancaster, Pa., which institution accorded him the honorary degree of Doctor of Science in 1942. His M.D. was obtained at the School of Medicine, University of Pennsylvania in 1906. After interneship at the Methodist Hospital, Philadelphia, he practiced for a time in Stroudsburg, Pa., until such time as he decided to specialize in dermatology. With this change in view, he entered into postgraduate study in Vienna and eventually began practicing his specialty in Philadelphia. In 1916, being commissioned in the Medical Reserve Corps, he applied for active duty and was sent to Hawaii. World War I service followed, for the most part at stations in this country, and, with continuing interest in the post-war Medical Corps organization, his ultimate rank was that of Colonel, Inactive.

On returning to civilian practice, Dr. Ludy acquired a considerable clientele, much of it, at least at first, derived from his former associates in the "Dutch country." He was one of them, with no language drawback, and his cheery bilingual conversation interspersed with jokes unintelligible to the non-German-speaker, made the bystander envious of the evident, but non-participated, enjoyment.

Dr. Ludy was active in a number of the important hospitals of Philadelphia—with Dr. Hartzell at the University Hospital and later Dermatologist to the Philadelphia General, Lankenau, Episcopal, Methodist, American Oncologic and Abington, in addition to being on the Skin Staff of the Pennsylvania and Consulting Dermatologist to various institutions including the Delaware County and Norristown State Hospitals.

Dr. Ludy especially excelled in therapy. He prescribed local applications skillfully and largely restricted his use of physical methods to conditions requiring destructive effects. Although he employed the Xrays in his earlier years of practice he ceased to use them in the last twenty-five years of his life, substituting radium for the treatment of malignancy and relying on other methods for inflammatory outbreaks.

He was a contributor to the literature of his specialty, his chief activities consisting of editorship of the dermatological portion of the Cyclopedia of Medicine, Surgery and Specialties and, earlier, Ludy's Atlas of Skin Diseases. At the time of onset of his last illness he had almost completed for publication a new text-book of Diseases of the Skin.

Disinclined to physical activity, as far as sports or outdoor hobbies were concerned, Dr. Ludy was interested in patriotic and historical societies and social clubs. The Sons of the Revolution, Pennsylvania German and Netherlands Societies were leaders among the former as was the Union League of Philadelphia in the latter group.

For many years he was one of the most active members of the J. Aitken Meigs Medical Association. He not only was a most valued contributor to the scientific features of the meetings of the Association, but by his rare social charm and faculty for friendship he contributed greatly to the social features of the organization.

He was a specialist certified by the American Board of Dermatology and Syphilology, a fellow of the American Academy of Dermatology and Syphilology and of several local and national medical organizations. Dr. Ludy served for a number of years as member of the dermatological branch of the National Board of Medical Examiners in Philadelphia. For several years he instructed in dermatology at Jefferson Medical College.

His death on September 11, 1944, was the result of cardio-renal complications following lobar pneumonia six months earlier. He is survived by his wife, Gertrude Snyder Ludy and a sister.

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Memoir of William Ellery Hughes*

By JOSEPH McFARLAND

SOME years ago on a Saturday afternoon I walked up the aisle of the dimly lighted lecture hall of the University Museum, and seating myself in one of the very few empty seats, found that I was next to my friend of half a century, Billy Hughes, with whom I at once fell into conversation, and as the coming lecture was to be a travelogue, we naturally talked of travels. To my amazement he said, "McFarland, I am thinking of going to Africa." "Yes," I said, "what do you want to do there?" "I want to go safari," he said, "and hunt big game." "Why," I said, "wouldn't that be pretty hard on a man of your age? You must be somewhere around eighty." "Yes," he said, "we are over eighty"—and then I saw that Mrs. Hughes was sitting on his other side,—"but that doesn't matter, I am strong, an experienced traveller, and I like to hunt." "But," I said, "suppose you should be stricken with cardiac failure or apoplexy and die out there!" "McFarland," he answered, "it doesn't make a damned bit of difference to me where I die!" "Perhaps not," I said, "but it gives one's family and friends a great deal of trouble to get his body home, if he does die in some such inaccessible place." "But," he said, "why should they want to get it home? A dead body is of no use, and is worth no more in one place than another."

Just then the lecture began and the conversation ended, not to be resumed.

This philosophy was quite in keeping with the instructions he gave when, in his last illness, he felt death approaching, for he exacted a binding promise that the friend and physician who attended him would see to it that his body should be immediately incinerated and disposed of with no "viewing," no religious ceremony and no funeral.

All this is by way of showing that he was one of the most unostentatious men of my broad acquaintance. Being unostentatious he might, by some, be classified as *meek*. If meekness means modest and self effacing, he was meek, and one of those of whom it was said, "Blessed are the meek, for they shall inherit the earth." In one of the best senses he did inherit a world of sincere friends who loved him and trusted in him and his judgments. It has been said of him that he was a "doctors' doctor," and that he had treated more ill doctors than any other in Philadelphia. He once treated me!

If, however, meek is synonymous with timidity, he was not, for he was courageous and daring and would venture into the unknown without hesitation.

This is well exemplified by what occurred at the Blockley Hospital, where he conducted some experiments upon the treatment of typhoid fever. I am sorry that I am unable to document this circumstance, which took place just after I had finished my residency in the hospital and was away studying at Heidelberg. It was told to me by some who had seen and participated in the experiment, and I feel so certain of its veracity that I do not hesitate to tell about it here. Unfortunately, during the half century that has elapsed since it happened, all who could confirm it have died.

In those days, 1890–92, typhoid fever was a

* Read at the meeting of the College of Physicians of Philadelphia, February 7, 1945.

devastating disease in Philadelphia, and all its hospitals contained many cases. The medical wards of the Blockley Hospital abounded with it. Its treatment was based upon knowledge of its morbid anatomy, and directed toward preventing perforation of the intestinal ulcers, which it was thought that any solid food might effect. The routine treatment consisted in administering a few fluid ounces of milk and a tablespoonful of whiskey every two hours. It was supposed that that amount of milk would support life and that amount of whiskey stimulate the patient and aid his digestion. How many times when I was the resident in charge of the medical wards have I seen a strong well-nourished man or woman, in the early days of typhoid fever, brought into the hospital and placed under this treatment, rapidly waste, fall into a low muttering delirium and die; or if they did not die, emaciate almost to a skeleton, and slowly recover through a long period of weakness!

Hughes knew all this, and anticipating his time, thought to correct it. He, therefore, one day astonished his interne, by ordering the "house diet" for a newly arrived patient. The resident demurred and an argument took place, but of course the chief prevailed. But, "alas for the best laid plans of mice and men", the conversation had been overheard by nurses and other residents by whom the ordered treatment was discussed, and rumors spread through the hospital, until the matter was reported to the Board of Charities who considered such departure from convention outrageous, and notified Dr. Hughes that unless he immediately countermanded that order, and continued to treat his cases of typhoid fever scientifically his resignation would be accepted. So the experiment was ended.

This episode indicates that he was a thoughtful, clever, courageous, self reliant man. These qualities stood him in good stead in all life's relationships and in medicine made him the excellent diagnostician and consultant that he was.

He was modest almost to the point of self-effacement. It is often little things that reveal the true man. I knew a pompous, sententious, aggressive physician, whose attainments were not equal to one-tenth of those of Hughes, whose signature was spread out over four linear inches of space exclusive of the A.M., M.D., Sc.D., LL.D., etc., appended to it on formal occasions; I have also many times smiled to see W. E. Hughes written in about an inch and a half of space with nothing following it.

Hughes was what might be called a grave man. He laughed little, never boisterously, but his smile was ever kindly and his words often conveyed a delightful though subtile wit.

When in February 1941 the Philadelphia County Medical Society sent to the Physicians of Philadelphia a "Classified Questionnaire" for the "Evaluation of Qualifications for Service in the Event of National Emergency," Hughes answered in a thoroughly characteristic manner. He was, at that time eighty-four years old, and had a wife and an unmarried daughter. Mr. William F. Irwin, Secretary of the County Society, has kindly permitted me to examine the paper returned by Hughes. Only 10 of the 23 questions are answered, five of the answers consisting of one word only. The answers of most interest are to questions #3 and #8. The former, #3, says "Dependents; give name, age, and relationship." Answer: "None." The latter, #8, "How much time will you require to arrange your affairs before reporting for duty in the event of a national emergency?" Answer, "One minute."

Hughes was generous with his knowledge and his ideas. The latter he freely gave to the younger men who worked under him so that they later, if published, appeared rather to belong to them than to him. This is particularly true of the conjoint authorship that existed between him and W. S. Carter, who was his resident at Blockley Hospital in 1893 and 1894. Carter was capable and ambitious and subsequently became Professor of Pathology, and later Dean of the Medical School of the University of Texas. During their association at the Blockley Hospital three papers bearing their conjoint names were published, each both clinical and experimental, but leaving it a question whether the ideas originated with Hughes and were worked out by Carter, or whether Carter conceived and executed the work, using Hughes' patients as the subjects. The latter idea would seem to be supported by the paper he once published with W. G. Spiller, in which changes were found in the spinal cord of a patient with pernicious anemia. Hughes never did any work on the nervous system, though Spiller became a professor of neurology.

Hughes published so little as to surprise even those who knew him best. Everyone to whom I have told the results of my search for his writings

seems to be astonished to learn that excepting a graduation thesis, which, by the way was not published, but exists only in manuscript form, in all the sixty-seven years of his doctorate, only five published papers bearing his name have their titles mentioned in the great medical indices. Whether it was the modesty already mentioned, or indolence that disinclined him from the drudgery of writing, or some philosophical idea opposed to it I do not know. Might he have said the great Socrates wrote nothing, but look at the greater Plato?

Hughes was more than a physician: he was a scientist and delighted in Nature and Nature's creatures. Chief among these interests ornithology seems to have occupied the first place, but at the Academy of Natural Sciences, where he was well known, and to which his rich collections of bird's eggs has gone or will go, he left no permanent traces. When I had looked through their library card catalogue, and inquired of the head of the department of ornithology, Dr. von Schauensee, what contributions to the knowledge of the subject he might have made, I learned that it was the same as in medicine: he had written nothing!

He had some interest in mammals, but it was quite secondary to that in birds. He made substantial additions to the Academy's collection of bird and small mammal skins as he returned from his various travels. His home was decorated with trophies of travel and the chase.

Hughes was an ardent hunter, and it was partly on that account that he joined expeditions or took long private trips into distant and wild countries. With the burden of increasing years upon him his energetic mind revolted at the monstrous inactivity of old age, and he conceived the idea of "going safari" to Africa. In the conversation about it with which this memoir opens he seemed to be perfectly sincere and earnest, but I am not sure that he was not partly in jest to see what I would say.

He was widely travelled. Mrs. Hughes told me that "he was everywhere except South Africa and Australia." He was an ardent photographer and often entertained groups of friends by "travelogues." Only once did I find it recorded that he did this publicly, and that was on March 7th 1930, when in the Eleventh Series of Ludwick Lectures, he spoke upon "Conditions in Russia as I found them in the past Summer."

He was in South America in 1912.

The most famous of his travels, however, was in the Arctic with Robert E. Peary.

Peary had been exploring Greenland in 1886 and proposed a more complete survey of the subcontinent. Accordingly, under the auspices of the United States Navy, and partly subsidized by a party of scientists from the Academy of Natural Sciences of Philadelphia, known as the West Greenland Expedition, they set out June 6th, 1891, returning July 29th, 1891. The personnel of the expedition was—Prof. Angelo Heilprin, Commander and Geologist; Prof. Benjamin Sharp, Zoologist; Prof. J. F. Holt, Zoologist; Dr. William E. Hughes, Ornithologist; Mr. Levi W. Mendel, Entomologist; Dr. William H. Burk, Botanist; Mr. Alexander C. Kenealy, Reporter for the N. Y. Herald; Dr. Robert N. Keely, Jr., Surgeon; Mr. Frazer Ashhurst. Each of these gentlemen contributed a sum of one or more thousand dollars for the privilege of joining the expedition. I eagerly searched for the report of this expedition, hoping to find some paper about the birds of the Arctic written by Hughes. There was none!

Once Prof. G. Sims Woodhead of Cambridge University, England, and I were walking along one of the corridors of a Philadelphia Hospital when Hughes came along. I introduced them; they chatted for a moment or two, then as Hughes walked away, Woodhead turned to me and said, "What a kindly face he has!" He had, but it was no more kindly than the man behind it. In fifty years I never heard him speak unkindly of any man. As his indignation was sometimes aroused, and as his language not always free of profanity, it is quite possible that he may sometimes have expressed his anger against or contempt for some one very forcibly, but I never heard it. On the contrary, his native kindness rather led him to excuse or make allowance for the faulty. It was so, for example, with the surgeon of the Peary Arctic Expedition, a young man named Frederic A. Cook, whom all will unfortunately remember as the claimant for the discovery of the North Pole. Hughes said of him: "When I knew him in 1891, he was a delightful, intelligent, modest young man." In 1909, Cook returned from a private Arctic expedition, with the statement that he had reached the pole April 21st 1908, and was received with every demonstration of enthusiasm and made the recipient of various honors. Peary came back with the statement that he had reached the pole on April 6th 1909, accompanying it with such

indubitable evidence as to make it a fact, after which the unsupported mere say so of Cook was discarded. Hughes always defended him, attributing his action to insanity. It is, by the way, highly probable that Hughes was right as Cook's subsequent actions in the way of shady financial operations that finally landed him in gaol, probably show.

Hughes was over six feet tall, slender, erect and commanding, and although age slowed his movements, his shoulders never drooped. His mind was clear, and I found him with patients in his office when I saw him for the last time, a month before he died at 87 years of age.

Once, a few years before his death, I called his attention to something new that I had read in a medical journal, inquiring whether he had seen it, and what he thought of it, and was amused when he said that he had not, didn't care about it, and ended up by saying, "McFarland, I don't care if I never learn another damn thing."

William Ellery Hughes, of Welsh antecedents, was born in the borough of Phoenixville, Chester County, Pennsylvania, October 9th 1857. His early education probably was had at the school of his native borough, but his high-school was the Friends' Central School of Philadelphia, from which he graduated in 1874. After that he spent two years at Ursinus College, Collegeville, Pa., 1875–1877, but from which he received no degree.

He entered the Medical Department of the University of Pennsylvania in the autumn of 1877, in the first class to which a three year course of instruction was given. He pursued simultaneously with his medical studies, the "Course Auxiliary to Medicine" that had been established by Dr. George B. Wood, and graduated in 1880 receiving at the same time the degrees M.D. and Ph.D. He was for one year a resident physician at the University Hospital, and for another year at the Childrens' Hospital, and was licensed to practice in Pennsylvania in 1882.

He was Medical Registrar at the University Hospital from 1881 to 1888; Assistant in Physical Diagnosis 1892–3; Instructor in Physical Diagnosis 1892–3. In 1897 he was chosen to be the Professor of Clinical Medicine, in association with Dr. James M. Anders, at the Medico-Chirurgical College of Philadelphia, which position he resigned in 1905. He was a Mason, and a member of the Colonial Lodge #631. He was also a member of many medical and scientific societies:—The American Medical Association, and the State and County Societies; The College of Physicians of Philadelphia since 1892; The Pathological Society of Philadelphia—elected 1882, President 1897–8; The Association of Surgeons of the Pennsylvania Railroad; The Meigs Medical Society of the Jefferson Medical College; The Medical Club; The Academy of Natural Sciences; The Zoological Society; The Geographical Society 1917–1942; The Delaware County Ornithological Club; The Audubon Society; The Penn Forestry Association; The Wilderness Club; The Saint Andrews Society; The Sons of the American Revolution. He was also a member of the General Alumni Association of the University of Pennsylvania.

The list of his literary productions is so short that it can be given in full:—

The Senior student graduation thesis, presented in manuscript and now in the library of the College of Physicians:—"Record of the Anomalies Found in the Dissecting Room of the University of Pennsylvania," 1878–9 by W. E. Hughes.

The papers from the Blockley Hospital:—

"A Case of Pneumonia Treated by the Transfusion of Blood from a Convalescent Case" by W. E. Hughes and W. S. Carter. The Therapeutic Gazette VIII. 1892–3.

"Clinical and Experimental Study of Uremia" by W. E. Hughes and W. S. Carter, Am. J. Med. Sci. 1894. 108.

"Injections in Pneumonia and Typhoid Fever of Sera from Convalescents" by W. E. Hughes and W. S. Carter. Therapeutic Gazette 1894. V-10.

"Case of Severe Anemia with Changes in the Spinal Cord," by W. E. Hughes and W. G. Spiller, Phila. Med. J. 1901 V.6.

"Syphilis of the Lung Simulating Phthisis" by W. E. Hughes and Robert N. Wilson. Med. News 1905 V. 88.

To my surprise and delight, in turning over the pages of an old copy of the General Magazine and Historical Chronicle of the University of Pennsylvania for 1932 I found a paper—the only one that I know to exist—by Hughes himself. It is entitled, "The Care of the Aged" and is one of the early papers upon Geriatrics. At the time that he wrote it, he was, himself seventy-five years old, and was probably interested in his own health and survival. I think the paper worth reading as much on its own account as because of present senti-

mental interest in its author. It is good science, and in it are a few characteristic flashes of wit. Here is an epigram worth remembering: "When we dance the efficiency dance, we must pay the longevity piper." The closing paragraph is worthy of attention:—

"Our medical duty to the aged, then, is to see that they have avoided the injurious effects of infection or similar accidents, to preach against worry and undue haste, and finally to make their final years comfortable, hoping that in the distant future every man will live out his expectancy in the end, like the old one horse shay, suddenly and painlessly, resolve himself into a pile of dust."

Whether he attended to any of the prescribed admonitions or not I do not know, but his end was very much like that which he hoped for for others. He died quietly, painlessly, in full possession of his mental faculties, after a short illness, in his bed, at home on March 19, 1944, aged 87 years.

If any here believe that "the good die young," let him notice that they sometimes live to be old!

Memoir of Walter Hughson*

By WILLIAM HEWSON

MR. CHAIRMAN and members of the Section on Otolaryngology of the College of Physicians and the Philadelphia Laryngological Society, at our first joint meeting of the Season (October 18th 1944) there was held in this hall a symposium on Aural Rehabilitation of the Navy.

This program though arranged some time before, seemed at the time to be a memorial to two of our distinguished members, Dr. James A. Babbitt and Dr. Walter Hughson.

Dr. Walter Hughson died Sept. 13, 1944, just a month and five days before that meeting, and Dr. James A. Babbitt just three days before the meeting. They were both so interested in the subject and so intimately associated in the organization of Aural Rehabilitation that I dare say most every one present was conscious of the interest these two would have taken in the meeting had they been present.

Dr. George Coates will present a memoir of Dr. Babbitt before the College of Physicians sometime later. I have been asked to present a memoir of Dr. Walter Hughson at this Meeting. I take this a great honor for though I cannot claim intimate or very long sustained friendship with Walter Hughson, yet to me he was like a brother from the first day we met.

He was not particularly interested in genealogy, but believed he had descent from some Scotch Clan of that same name. His grandfather, Walter Hughson practiced medicine in Poughkeepsie, and lived in Hughsonville, a small town on the Hudson River nearby. His father also Walter Hughson married Nancy Herbert Marcus, a great granddaughter of Sir William May Fauquier, brother of one of the last Colonial Governors of Virginia. Walter was born in East Orange, New Jersey in 1891. His father had given up business in New York City, had moved to Spokane, Washington, and returned to New York to study for the ministry. When quite small Walter and his two sisters moved with their parents to Detroit, Michigan, where his father had a Church. In 1900 they moved again, this time to North Carolina to a small town called Morganton, where his father founded Grace Hospital in 1907, and ministered to the mountaineers of that section. After his father's death in 1909 his mother carried on the work with the hospital until her death in 1924. It is a fine tribute to their foresight and industry that this hospital now accommodating about 250 bed patients is well supported in this rural community.

As a child Walter accompanied his father and mother to the various missions and hospital, and must have absorbed some of their spirit of devotion to the interest of others. Even as a child his sister records an unusual charm, which made everyone fond of him. Older people were particularly impressed with his simplicity, grace of manner and kindness. His early schooling was interrupted by moving from place to place, but later he attended St. Paul's Choir School in Baltimore, and then St. Paul's School in Concord. Both Episcopal Church Schools through the association of his father.

In 1914 he graduated from Princeton University with Degree of B.S. and in 1916 received his M.D. Degree from Johns Hopkins University Medical School. He was a good student, standing well in his classes and had unusual capacity for concentration. He made friends easily and was good company in any gathering. He had a good rich baritone voice and enjoyed music with his family and friends. He married Mildred Curtis of Yonkers, New York in 1917, and made his home in Baltimore, where he was associated with Johns Hopkins Medical School for about fifteen years. In the summertime he hospitably entertained friends at Gibson Island, where he and Mrs. Hughson were among the first settlers to make that place popular. He was fond of sailing and most outdoor sports, and he inspired his children with good sportsmanship and a love for the out of doors. His family life was an inspiration to any visitor, and his four children reflected his good humor, cordiality and politeness to a remarkable degree.

It would be too tedious to recite at this time the many steps of progress in his professional career

* Read at the joint meeting of the Section on Otolaryngology of the College of Physicians of Philadelphia and the Philadelphia Laryngological Society, December 20, 1944.

from internship at Johns Hopkins Hospital to teacher in Anatomy, then Surgery, then Otology in Johns Hopkins Medical School, and the recent remaining nine years spent amongst us in Philadelphia. Walter Hughson's courage was tested to a greater extent than any of us knew. He reluctantly gave up general surgery because of a tremor in his right hand and developing tinnitus and at times right sided vertigo. These symptoms grew worse, the tinnitus especially, which induced him to seek aid in several countries of Europe in 1930. The operations on sinuses, teeth and right mastoid were no less distressing than inflation treatments, which he endured at the hands of most of the aurists consulted. He returned from Europe no whit relieved, but it was soon discovered that a giant-celled sarcoma of the Xanthoma type was invading his temporal bone. The entire function of his eighth nerve on the right side was destroyed. Large doses of X-ray and radium therapy were given and when in the course of six or eight months he felt shoulder pains and had difficulty moving certain neck muscles on the right side, he was more or less convinced that the tumor was growing. Dr. Dandy exposed his temporal fossa on June 20, 1933, and removed a part of the tumor from the petrous portion of the temporal bone. The X-ray and radium therapy were blamed for the shoulder and neck pains.

These facts are mentioned because it was during this time that he began and developed his research in Otology. He constantly lived under the suppressed threat of regrowth of the tumor, but from 1935, when he assumed the Directorship of the Otological Research Laboratory at Abington until his death, we must acknowledge that he accomplished outstanding work. He wrote many papers supported by careful research with animals and instruments. He taught in the University of Penna. Medical Schools (both Graduate and Undergraduate). He developed an operation for selected cases of deafness (the round window graft operation). He was sought after for consultation in hearing problems by numerous Otologists. The Bureau of Child Hygiene and the U. S. Public Health Service, The Department of Psychology of Princeton University, and the Aural Rehabilitation Program of the Navy Department all made him their consultant. He never lost interest in the individual case and would spend literally hours studying a case problem without thought of compensation. It may surprise most of us to learn that he worked without salary and if it had not been for the generosity of his relatives and friends his work in the laboratory could not have gone on.

He was a member of three of the most distinguished National Otolaryngological Societies in this country, and took an active part in their programs and activities. It is not intended here to present the names of all of the scientific societies to which he belonged for they were too numerous. He was interested in our societies and never failed to have something of real interest to present. We will all remember him, I am sure, by his clear and carefully correct presentations. His manner of studied expression was due to muscular weakness in the right side of his face and tongue, for which he learned to compensate; as well as, I believe, his earnest desire not to exaggerate the truth.

His death was under tragic circumstances, but in a manner perhaps, in keeping with his life. On Monday September 11, 1944, he left his laboratory at 9:30 in the evening, complaining of a headache and temperature, which began that day. While motoring toward his home he apparently became confused and perhaps helpless. His car ran off of the road. Two days later he was found alongside of his car unconscious. He was taken to the Abington Memorial Hospital, where he died that same evening.

Autopsy revealed a diffuse suppuration in his temporal bone with meningitis and small temporal lobe abscesses; a remarkable pathology for so few symptoms. If he had suspected such or somewhat similar conditions he could not have spent his time more bravely or profitably.

Memoir of James A. Kelly*

By JAMES A. LEHMAN

IN THE Annals of Philadelphia medicine, the name Kelly has occupied an honored position for several generations.

The first of the name, Joseph Vincent Kelly, the grandfather of the Author and the Father of the subject of this Memoir was a distinguished physician of this city for many years. Shortly after the termination of the Civil War, in which he served with conspicuous gallantry, he matriculated at Jefferson Medical College with the class of 1868. After graduation he began the practice of medicine in that quaint section of Philadelphia known as Manayunk. He acquired a large clientele, and his reputation was respected by everyone. He was austere and pious. One who knew him well states that he was noted for his brevity and correctness in speaking and writing. He had good sense and was utterly honest and sincere; with a love for all that was right and good, and a hatred for all that was evil.

In 1866 he married Emma Ferguson and their third son, born on February 20, 1878 was named James Alphonsus. Many of you will remember the oldest son, A. O. J. Kelly, a distinguished physician of his time, who met an untimely death early in a brilliant career. The youngest son, Thomas Charles, is a well known pediatrician of this city.

James A. Kelly's early education was acquired in the parochial school. He was given his A.B. at La Salle College in 1897 and his M.D. at the University of Pennsylvania in 1901. Like his father, he was associated, during all his professional life, with St. Mary's Hospital, first as an interne and later as Surgeon. He did special work in Surgery at Boston City Hospital from 1902–1904, returning to Philadelphia to establish a practice in surgery. In 1905 he was appointed surgeon to St. Mary's Hospital and the following year received a similar appointment to St. Timothy's Hospital. He was associated for a time with the late John B. Roberts at the old Polyclinic Hospital and was co-author with him of an excellent Textbook on Fractures. Appointments as surgeon to St. Joseph's Hospital in 1910 and to Misericordia Hospital in 1917 followed. He held the title of Associate Professor of Surgery in the graduate School of the University of Pennsylvania. His last appointment was as surgeon to the Fitzgerald-Mercy Hospital in Darby.

During his lifetime he had an enormous surgical experience and few of his contemporaries exhibited equal skill. He was an extremely rapid operator, but never sacrificed care and meticulous technique for speedy completion of an operation. He excelled in fracture work and was an early enthusiast for the open reduction of fractures. His interest in this type of work never waned.

His life was plagued by repeated illnesses and operations. Several times his life was despaired of.

Although he was not a prolific writer, he a ways spoke with logic and knowledge at Surg cal meetings. Owing to his ability, his wide experience and his enormous practice, he earned an enviable reputation as an operator and his opin'on was sought by many. In the field of clinical surgery he was surpassed by few.

He was honored by La Salle College, Villanova College and St. Joseph's College. He was a Fellow of the American College of Surgeons and a member of the Philadelphia Academy of Surgery as well as a member of the Founders group of the American Board of Surgery.

In 1905 he married Rose McDonald, who, with a daughter, Mrs. James A. Moore, survives him. He was a man of strong convictions. He fought hard for things in which he believed, but if shown a better way, he submitted and supported. His interest was never lukewarm, it was always hot.

There was no department of the Hospital in which he was not interested. He criticized sharply sometimes, but always constructively. He was not always angelic, but always emphatic. Everyone knew where he stood. He had independence and courage. His promise was a fulfillment. His enthusiasm for his work was unbounded. His influence on the personnel about him was wholesome, stimulating and well worth emulating.

He loved friends and had hosts of them, but his

* Read at the meeting of the College of Physicians of Philadelphia, December 6, 1944.

close friends he cherished as something sacred. He was a great companion. He loved to play golf and was one of the Founder members of the Doctors Golf Association.

His greatest interest, however, was in his chosen profession. He stood at the very top in his specialty. He sought the intellectual light in his work. He was a good diagnostician and a skilled technician. He had a gentle human touch.

"Tis the human touch in this world that counts,
The touch of your hand and mine,
Which means far more to the fainting heart
Than shelter and bread and wine,
For shelter is gone when the night is o'er
And bread lasts only a day;
But the touch of the hand and the sound of the voice
Sing on in the soul alway."

His death on March 7, 1944, was due to mesenteric thrombosis, a complication of a long standing condition which had interrupted his career on several occasions. He died, as he wished, active to the end. He worked until several hours before he was operated upon. He never recovered fully from the operation. It could truly be said of him: "He hath done all things well".

Memoir of William Gray Turnbull

By TRUMAN G. SCHNABEL

ALL of us, who lived then, will remember the decade which followed the last world war. All of the sobering and disquieting effects of that struggle seemed to be quickly dissipated by a wave of financial prosperity which swept the breadth of our country. It was plain that most of our citizenry little believed that the golden era would ever end. A general pattern of private, industrial and public speculation and physical expansion prevailed. Hospitals were caught up in this spirit of bullishness and thus it was that the gray, heavy walls of old Blockley were torn down and what then seemed like palatial ones rose in their stead.

It was in 1928 that William Gray Turnbull, Fellow of the College, took over the executive conduct of the Philadelphia General Hospital. The job of rehabilitating the venerable institution had not been completed, the financial crash of September 1929 was in the offing and the tough years of the 1930's lay ahead. His was then a difficu t job, beset with more than the usual run of trying problems. It is during these years of Bill Turnbull's stewardship that most of the Fellows learned to know him and admire him. All agreed when he died, March the eleventh 1944, while walking on "his" hospital grounds, that he merited the encomium "Well Done".

Doctor Turnbull's boyhood days were spent in small rural communities, his lineage was pure Scotch, and his family life was naturally conditioned in a large measure by its paternal head, who was a clergyman of the United Presbyterian Church. He excelled scholastically, engaged in sports and gunning and worked on neighboring farms during his vacation months. Thus it was that he grew up to be strong of body and mind.

That strong body of his was well needed at Monmouth College when he played fullback and captained the varsity football team, ran the hundred yard dash in ten seconds, and made excellent records in putting the shot and throwing the discus. His well organized and thoughtful mind bore fruit in medical school, when he achieved to membership in Sigma Xi, Alpha Omega Alpha, won the Spencer Morris Prize and the first rank in his 1906 class. "Our Bill" had taught high school algebra and latin and coached h'gh school teams in the interim between college and medical school. So it was, that he was somewhat older than his medical classmates who regarded him, even then, as a self composed, reliable, kind and helpful friend, somewhat reserved but not without a sense of humor. He was ineligible for varsity football at Pennsylvania, but he did tutoring, sang bass on church choirs, laid pipe lines in West Virginia during vacation time, and walked to and from his parental home in Strawberry Mansion each day.

He married Ellen M. Loftus, after he had completed his interneship and chief residency at the University Hospital. She shared with him the trials and tribulations of developing a general medical practice, undertaken on North Fortieth Street in this city. She survives Doctor Turnbull as does an only son, William G Turnbull, Jr., Captain in the United States Army.

It was his excellent work in a State Tuberculosis Clinic here in Philadelphia which paved the way for his first institutional appointment and thereby settled his concern for the future. After four years of private practice and his clinic experience with tuberculosis, he became the Medical Director of the State Sanatorium for Tuberculosis at Cresson, Pennsylvania.

Eleven years were devoted here to the interests of tuberculosis and the institutional care of those afflicted with this disease. He was granted a leave of absence from Cresson during the last world war to administer as a medical officer, the Army hospitals for the tuberculous located at New Haven, Connecticut, Asheville and Waynesville, North Carolina. He was appointed Deputy Secretary of Health for the State of Pennsylvania after his tenure at Cresson and after four years experience as a state official he became the Superintendent of the Philadelphia General Hospital. It can be said then, that thirty-two years of Turnbull's life were given to a professional interest in tuberculosis and the administration of special and general hospitals.

His 'nterest in tuberculosis did not extend to the publication of any clinical observations or personal reflect ons on the disease. Although he abandoned a teaching career early in life, he did manifest a thorough working knowledge of the disease in

instructing ward classes, in teaching clinics and in informal addresses. A personal association at the bedside of nurse patients, confirmed one in this same impression and conferred upon him the stamp of a thoroughly practical and sensible phthisiologist. His chief contribution to the cause of tuberculosis was made by the organization and conduct of a model institution at Cresson and his support and drive for an adequate tuberculosis program for the State of Pennsylvania. It was during his tenure at Harrisburg that the sanitorium at Hamburg was erected and he is credited with the conception and development of the first State Hospital for Crippled Children at Elizabethtown, Pennsylvania.

Turnbull was not a high powered hospital executive. He usually managed and directed in a quietly positive manner, born of confidence in himself and the thorough knowledge he possessed of hospitals, their physical equipment, their personnel, their conduct and function in the community. Occasionally, when the need arose, there was the stern note of command and conciseness of direction. There is here again the regret that we have no literary legacy for those who might care to read and learn of his views on hospital management. It is recalled, however, that he disapproved of our bulky and repetitious medical literature generally. The care of his hospital patients ranked first among his concerns. He recognized and furthered the educational role of his hospitals in their several communities and he felt the need of and encouraged research, when honestly conducted and published. He did not hesitate to institute new and worth while procedures for diagnosis and therapy. He understood human frailties and dealt with them accordingly: sometimes, his friends felt that he was too lenient. Curiously enough, he rather enjoyed dealing with public officials, or politicians if you like, as his public positions required of him. He did this exceptionally well, and usually such contacts redounded to the benefit and satisfaction of all concerned. I doubt whether he had one avowed enemy. He was always on the job and rarely took a holiday. At one time he considered Architecture as a vocation and his artistic bent was evidenced in his beautiful carvings of oriental woods and gun butts and the reproduction and assemblage of old fire arms. He was fond of gardening and took especial pride in beautifying the grounds of the Philadelphia Hospital. He was not too out going, but he did enjoy people and particularly the good fellowship of the Meigs Society.

He was elected to Fellowship in the College in 1935. He served as one of its Elective Councillors from 1941 to 1944.

William Gray Turnbull received the Strittmatter Award for 1936. This award is presented each year by the Philadelphia County Medical Society to one who has achieved to "high ideals and distinguished service, redounding to the credit of the Medical profession and in the interest of humanity." A citation going with the Strittmatter gold medal, indicated, in addition, that in Bill Turnbull's case, the award was given "in recognition of his devotion and self sacrifice in the field of tuberculosis." To this, I am certain, the Fellows add now, some nine years later, a heartfelt Amen.

BIOGRAPHIC DATA

April 6, 1876: Born to Thomas B. and Jean Horne Turnbull at Aledo, Illinois. Paternal and Maternal Grandparents born in Falkerk and Jedbury, Scotland. Thomas B. Turnbull born in Monmouth, Illinois in 1846. Graduate of Monmouth College and Allegheny U. P. Theological Seminary, Pittsburgh, Pennsylvania. Jean B. Turnbull born in Switzerland County, Illinois, Graduate of Monmouth College, Illinois.

1895: Graduated Argyle High School, New York.

1899: A.B. Degree, Monmouth College, Illinois.

1899–1902: Instructor of Latin and Algebra and Football coach, Pontiac Michigan High School and Dixon High School, Illinois.

1906: M. D. University of Pennsylvania Medical School.

1906–1908: Intern and Chief Resident at Hospital of the University of Pennsylvania.

1908: Married Ella M. Loftus of Urbana, Illinois.

1908–1912: Practiced Medicine on 40th Street, Philadelphia.

1912: Medical Director, Pennsylvania State Sanatorium, Cresson, Pennsylvania remaining there for 11 years.

During first World War, Major in Army Medical Corps.

1923–1928: Deputy Secretary of Health for the State of Pennsylvania.

1928: Superintendent of the Philadelphia General Hospital.

1936: Awarded the Strittmatter Award.

1944: March 11th, Died.

President's Address*

By O. H. PERRY PEPPER

THE past year was the 157th since the College was instituted in 1787. In its long life, the College has maintained its activities through repeated periods of pestilence, war and financial depression; it is doing so now in time of war, and it is the duty of every Fellow to see to its future. Our College has seen far darker days than the present when our unjustified optimism of a year ago has been replaced with a pessimism which may be equally at fault.

As might have been anticipated there could be little now for the President to report for 1944, but it is surely gratifying to be able to state that every part and purpose of our College has functioned successfully during the year. Indeed there is evidence of healthy growth in several directions.

Each of the Sections and Committees has performed its duties efficiently. The nine joint meetings with the Philadelphia County Society have been worth while and well attended. Financially, the College lived within its lessened income; additional funds are grievously needed. Membership now numbers 724 of whom 44 are non-resident; 128 are in active military service.

Your President urges every Fellow to read through with care the Annual Report on the Library when it appears in the *Transactions*. We are too apt to take the excellence and smooth running of our Library for granted, and few suspect the amount of skilled interest, hard work and funds which go to bring this about. This year's report is not only interesting in itself but it will open the eyes of many if only it is read. The possibilities of the micro-card system promise much for the library in the future. A medical library needs be more than a collection of reference books and journals; witness our pride in the acquisition of an incunabulum—the *Pillularium* of Pantaleo printed about 1484; witness the exhibits arranged by the Librarian and other activities. No wonder the number of visitors to our library in 1944 increased over 1943 by more than 1000 and more volumes were taken out. The College is highly appreciative of how greatly these successes are due to the Librarian.

* Prepared for the business meeting of the College of Physicians of Philadelphia, Jan. 10, 1945.

Great books never die but are cherished on the shelves of our libraries. All men great and small must die and the most that can be done is to record and honor their memory. The College has lost by death in late 1943 and in 1944 twenty-two Fellows, two Non-Resident Fellows and one Honorary Fellow. They were the following:

Sir Humphry Rolleston, *Honorary Fellow*, elected March, 1928;
died September 24, 1944.

William E. Parke, *Non-Resident Fellow*, elected November, 1899;
died June 26, 1944.

Harlan Shoemaker, *Non-Resident Fellow*, elected October, 1908;
died December 11, 1943.

James A. Babbitt, elected a Fellow April, 1906;
died October 15, 1944.

Edward Warren Beach, elected a Fellow March, 1938;
died April 29, 1944.

Stillwell C. Burns, elected a Fellow February, 1906;
died November 2, 1944.

Charles W. Burr, elected a Fellow April, 1892;
died February 19, 1944.

B. Franklin Buzby, elected a Fellow January, 1934;
died October 22, 1944.

Walter Chrystie, elected a Fellow May, 1903;
died December 9, 1944.

Alex. Heron Davisson, elected a Fellow December, 1900;
died February 29, 1944.

William E. Hughes, elected a Fellow November, 1892;
died March 16, 1944.

Walter Hughson, elected a Fellow May, 1937;
died September 13, 1944.

James Kay, elected a Fellow January, 1923;
died April 21, 1944.

James A. Kelly, elected a Fellow November, 1909;
died March 7, 1944.

Karl Kornblum, elected a Fellow January, 1932;
died May 16, 1944.

Frederick H. Krauss, elected a Fellow May, 1934;
died October 9, 1944.

John B. Ludy, elected a Fellow January, 1924;
died September 11, 1944.

Caspar Morris, elected a Fellow May, 1886;
died February 29, 1944.

Randle C. Rosenberger, elected a Fellow January, 1909;
died February 21, 1944.

Paul J. Sartain, elected a Fellow June, 1905; died April 9, 1944.

B. Franklin Stahl, elected a Fellow November, 1894; died March 20, 1944.

Arthur A. Stevens, elected a Fellow November, 1901; died June 10, 1944.

William G. Turnbull, elected a Fellow October, 1935; died March 11, 1944.

George A. Ulrich, elected a Fellow January, 1934; died July 18, 1944.

W. Reynolds Wilson, elected a Fellow March, 1897; died December 19, 1944.

Memoirs of the following were recommended by the Censors and will be found in the *Transactions*: Drs. James A. Babbitt,[1] Charles W. Burr,[2] William E. Hughes,[3] Walter Hughson,[3] James A. Kelly,[3] Karl Kornblum,[1] John B. Ludy,[2] Randle C. Rosenberger,[2] Paul J. Sartain,[1] Arthur A. Stevens,[1] and William G. Turnbull.[3]

The President cannot read this list of deaths without realizing the deep loss which the College has suffered from the deaths of these Fellows. A number of them had for many years served the College in a most valuable fashion. The year has been costly to our membership; the number of deaths far higher than usual; and we have lost many whom the College cannot well do without.

The College has, for a long time, had a class of members known as Honorary Fellows. This group is limited to fifty of whom twenty may be foreigners. The membership in this group has never approached these limits. At present, there are but three American Honorary Fellows and there have been but five Foreign Honorary Fellows. This number is reduced to four by the death of Sir Humphry Rolleston. It is proper that the President in this address should pay tribute to this Honorary Fellow of the College for his long life of service to Medicine. Sir Humphry always stood for the highest ideals in medical education and medical practice. He was a friend of American Medicine and visited this country where he was always welcome. He received many honors in his own native land and it is pleasant to think that our College added its little mite to his long list of well-deserved honors.

In the office of the College, all the reports of Officers, Committees and Sections are available for reading by any Fellow of the College. Your President feels certain that a survey of these will cause any Fellow to feel, as does the President, a mixture of pride in what has been done under adverse conditions and of disappointment that some greater advances could not be achieved. These must await the end of the war, at which time the College must be prepared to participate in assisting returning doctors, in the medical problems of that period and to a greater degree than ever in matters of civic and national health.

[1] To be published.

[2] *Transactions & Studies*, December, 1944.

[3] *Transactions & Studies*, February, 1945.

Annual Report on the Library*

Including the Second Report of the Honorary Director of the Department of Medical Art

FROM the standpoint of use and service, the library has had a good year, the state of the world at large being taken into consideration. Rather to our surprise, the attendance increased, despite staff difficulties that necessitated a reduction in our schedule of hours totaling the equivalent of some 29 library days. The fact that the in-circulation of material did not keep pace with the increase in out-circulation merely illustrates anew a wartime shift of emphasis in use of the library from peacetime research to the quickest solution of current, practical problems.

The expanding use of the inter-library loan and of the photostat service, the former having given assistance to 55 libraries in 13 of our States, is indication enough that the quality of our mercy is not strained. The geographical position of the library, narrowly squeezed between the greatest two medical libraries in the country, might be accepted as an invitation to decay as quickly and gracefully as possible. Actually, however, the inherited resources of the library are so potent that we need but to build upon their foundation with discrimination, and be wisely generous, to ensure the library's continuing indefinitely as a major station on the network.

The Micro-card Plan

In this period, while our minds are much occupied with the problems of repairing the ravages of war, it is a pleasant duty to call to the attention of our Fellows and other constituents who may not yet have heard of it, a recent development—called the micro-card plan—which may well prove a neat solution to a whole covey of our problems.

The micro-card plan is set forth in a book called "The Scholar and the Future of the Research Library" (New York, Hadham Press, 1944), by Fremont Rider. In a sense an extension of the present use of microfilm reproduction, Rider's plan proposes that the now largely wasted space on the back of the author and subject cards in our catalogues be occupied by a microfilm reproduction of the work described on the face of the cards. Reading machines, Rider foresees, will be so highly developed, compact, and inexpensive that libraries will be plentifully supplied with them; the research man will have one in his office and at home.

The library reader would borrow a card instead of a book, inserting (or an attendant inserting) in the card's place in the catalogue a slip bearing his name and enough data to enable others to locate the subject cards, which would, in effect, be so many additional copies of the book. If the reader wished to read the card-book elsewhere than in the library, he would perhaps insert it in a photographic slot-machine, obtaining in a few moments and for a few cents a duplicate card, which would be his to have and to hold.

A minimum of imagination is required to see what immense administrative economies such a development might be expected to effect, once the interlocking bastions of resistance—mental, mechanical, and legal—had been brought to terms. The aid to libraries and individual scholars in bringing them research materials otherwise out of reach by reason of cost or rarity is a still more attractive feature of the plan. At present, of course, operation would have to be restricted to non-copyrighted material—of which there is, however, a great amount that has important research value. At present, also, technical development of the equipment required has not reached a high enough stage to warrant an attempt at mass production. But the plan offers so rosy a vision to libraries, scholars, and a host of commercial enterprises, that it can hardly be doubted that whatever obstacles stand in the way of its realization will be overcome in due course. Before too many years have passed we shall be turning on our television machine, teaching and learning by audio-visual means, and reading micro-card books as casually as we today turn the knob on our radio and listen to a weather report from Shangri-La.

Now, the micro-card plan, so far as its application to book publication is concerned, is almost certain to be adopted only by publishers and authors with one of the heavier line of goods to sell. The "Forever Amber" publishers and their public will have no truck with it; nor will it put the "limited editions" people out of business. What

* Oct. 16, 1943–Oct. 15, 1944.

about the antiquarian, the bibliophile of one hue or another?

The old books are studied and cherished for a variety of reasons that often bear no relation to their textual content—for their bindings, typography, paper, water-marks, uniqueness, past ownership, to name but a few. The single fact that a book was printed in the first half century or so after the invention of printing with movable type gives it, regardless of its text, a categorical value: it is an incunabulum. It might, indeed, almost be said that, the older a book grows, the more our interest is inclined to be diverted from its primary reason for being, its text, to one or more of its physical features. No development of the micro-card can possibly affect these interests in our time. Nor could it affect our desire to hold in our hands and read a copy of the original edition of a work that spelled out greater happiness for the human race. We shall always cherish the amenities encouraged by the book as we know it. But those of us who must have constantly more and more books as tools, those of us who must try to accommodate irresistible growth to inflexible walls and budgets, can only hail the advent of the micro-card as potentially the greatest single cultural advance since the invention of printing itself. Since it is likely that many of the masterworks from our time on will be (at least first) published in micro-card form, we may lament that generations to come will lack in some degree the sentimental link with us that we have with the past. If the result, however, should be greater wisdom in the direction of man's affairs, through the wider dissemination of knowledge, then they will be the gainers after all.

An Incunabulum and Related Matters

A faithful reader of the foregoing paragraphs will find nothing incongruous in our passing now to a brief consideration of some of the year's loot in the form of historical treasures that quicken the mind, the heart, and the imagination. First mention goes to a newly acquired incunabulum.

Pantaleo de Confluentia: *Pillularium.* [Pavia: Antonius de Carcano: after 17 Feb. 1484.] (Reichling 1601. Klebs 720.1. Sec. Census P68.**) Perhaps the earliest historical mention of Pantaleo is that contained in the *De medicinae claris scriptoribus* of his younger contemporary Symphorien Champier; the latest, doubtless, that by Wickersheimer, in his *Dictionnaire biographique des médecins en France au moyen age* (1936). A valuable additional source of information concerning Pantaleo is G. G. Bonino's *Biografia medica piemontese* (1824). Suffice it here to say that Pantaleo was given a master of arts degree by the University of Pavia, 1438, and the degree of doctor of medicine two years later; was elected a Fellow of the College of Philosophers and Physicians of Turin in 1443. In his middle years he traveled widely in France and Switzerland and held high reputation in France. At one time he was physician to Louis XI, among other royal personages. Towards the end of his life he returned to Pavia, where he taught medicine from 1492 to 1496—the last that seems to be known of his career.

An erudite physician (so Champier calls him), Pantaleo was also the author of an elaborate treatise on milk and its products, first printed, about 1477, at Turin; Pantaleo is even credited with having helped to introduce the art of printing to that city. The *Summa lacticiniorum* and the *Pillularium* each had but one printing in the 15th century. They were rediscovered early in the 16th century, however, and were united at that time in several editions with the *Cautelae medicorum* of the Veronese physician Gabriele Zerbi, which also had had but one printing in the incunabular period.

Erudite this Pantaleo was, at least insofar as one may judge by his copious citations of the mediaeval medical authorities. It is not likely that a detailed study of his drugs—despite a certain amount of personal observation in the treatise—would add greatly to our knowledge of the mediaeval formulary, and certainly this is not the occasion for one. But there is a little bibliographical interest inherent in this edition which it may not be inappropriate to relay at this time.

As indicated above, it is generally accepted that this edition of the *Pillularium* was printed at Pavia by Antonius de Carcano, sometime after the 17th of February, 1484, but well within the 15th century. As recent a list as that of Klebs (1938) records but two copies, one in Milan, one in the Harvey Cushing Collection, at Yale.** Another, variant, copy, however, is listed in Carbonelli's *Bibliographia Medica Pedemontana Saec. XV–XVI* as being in the author's collection.

But the real story we set out to tell is this. While the authentic bibliographic description of this edition starts with Reichling, the *Pillularium* is also included in the bibliography of his great

** This Cushing copy is now known to be a fragment of one of the 16th century Pantaleo-Zerbi editions.

predecessor, Hain—a listing that is never referred to by subsequent bibliographers. Hain 7803 groups together, as though they were parts of the same edition, Bernardus de Gordonio's treatises on the urine and the pulse, Pantaleo's *Pillularium*, and Arnold of Villanova's *Breviarium*. The Bernardus de Gordonio works have subsequently been identified as the edition of Andreas Belfort's, of Ferrara, printed in 1487 and entered by Hain as his no. 7804. Of the Pantaleo and Arnold printings bound with the Bernardus in the volume which Hain described without having seen personally, nothing seems to be on record.

A little search discloses, however, that there is an edition of Arnold's *Breviarium* now attributed to Antonius de Carcano, at Pavia, about 1485—while our *Pillularium* is attributed to the same printer at almost exactly the same period. The fact that there was only the one 15th century edition of the *Pillularium* makes it seem very probable that the Pantaleo and Arnold printings in Hain 7803 were the unsigned editions of Carcano, brought out very closely together.

The library has long had a copy of Carcano's edition of the Arnold *Breviarium*; it now has one of the few surviving copies of his edition of the *Pillularium*; there are at least four copies of Belfortis' edition of the Bernardus de Gordonio treatises in this country. How enchanting to speculate that the three sisters of Hain 7803, torn asunder spiritually by the righteous bibliographers, and physically by some rapacious book-dealer, have triumphed over righteousness, rapaciousness, and reason to resume life together in the land of the free.

This *Pillularium* is the book that is entered in our records as largely the donation of Fellows who contributed to a fund through which a book of this sort might be added to the library in memory of Charles W. Burr, M.D. Our late Honorary Librarian and generous friend, it is reasonable to believe, has emitted one of his characteristic grunts of approval.

Baillie and Virchow. It is always puzzling, given the general quality of the library, to discover that it lacks a first edition of one of the major medical classics. For some years we had been aware that this singular condition existed with regard to the first editions of Matthew Baillie's "Morbid Anatomy" (London, 1793) and Virchow's "Cellularpathologie" (Berlin, 1858). By coincidence, copies of both were obtained during the year. The texts, of course, were available in other editions; but we are now able to provide that stimulus to the historical sense that comes with handling the original publication. The Virchow we purchased; Baillie's little book has for us the added, associational interest of having come from the library of our late Fellow, Arthur Newlin, M.D., through the kindness of Mrs. Newlin and our committee-member, John H. Arnett, M.D.

Exhibits of the Year

Despite the war, a number of national medical bodies held their annual meetings in this city, and it was our pleasure to arrange in their honor exhibits appropriate to their interests. Thus, for the Association of Military Surgeons we had an historical exhibit from the Sturgis Collection. For the International College of Surgeons (U. S. Chapter), an exhibit of international surgical texts from the middle ages to the 17th century. For the American Psychiatric Association, an exhibit of Rush manuscripts and printed editions, material from the Bradley and Sturgis Collections, and other memorabilia. Dr. Sturgis prepared from material in the Sturgis Collection a much admired exhibit of admission cards to early medical courses, the cards containing the signatures of many of the illustrious pioneers of American medicine. Another exhibit was of some of the more interesting dust-jackets from recent books, selected partly to illustrate the wide range of subjects the research medical library must poke its nose into these days.

Grants and Aids

The Smith, Kline & French Laboratories renewed its grant of $1,000, thus enabling us to provide a number of expensive works in contiguous fields that we would probably have had to forego otherwise. And, at the suggestion of Mr. R. H. Baugh, then the assistant in charge of our current periodicals, they generously provided us with mimeographed copies of our English-language list of current periodicals sufficient to distribute among all the local medical schools and hospitals—thereby facilitating use of the periodicals and, at the same time, making unnecessary the preliminary phone call to determine whether or not we received the periodical.

An unexpected aid, of the sort that benefits both exchequer and morale, was a gift of $50 from the director of the Lankenau Research Institute, Dr.

Stanley P. Reimann, in appreciation of the library's valuable contribution to the work of the Institute.

The Staff

The war caught up to us for fair, when it comes to changes in the staff. In January, we lost to the duties of an Army wife, Miss Helen Jackson, who had been on the staff for some 19 years, in the last decade presiding over the Ashhurst (circulation and reference) Room. In February, we lost, through ill-health, Miss Eleanor Mars, who had been an efficient page, photostat operator, and agreeable co-worker. In September, towards the close of the Library year, our woes were capped by the defection of Mr. Baugh, who for nine years had ruled in the Norris (current periodicals) Room, whither the footsteps of readers and staff alike turned whenever we were in trouble.

Not until June were we able to replace Miss Jackson, then having the good fortune to obtain the services of an experienced medical librarian, Mrs. Frank Shaffer. Our other page, Miss Mary Mars, heroically jumped in and replaced her sister as photostat operator; but the position of page remained vacant until very near the termination of the period covered by this report, when again we were fortunate in finding an excellent replacement in Miss Concetta Ciotti. Mr. Baugh had very considerately let his departure wait on the finding of a satisfactory replacement, so that, when he left, he was immediately succeeded by Miss Katherine A. Adams, who has quickly taken hold of the rather intricate mechanism of that department.

It is only proper to say that the necessity of making these replacements quite dramatically pointed up the not generally recognized fact that the salaries our assistants were receiving were considerably below the standard obtaining for librarians of their experience and ability. The committee were quick to recognize this situation, however, as the emergency developed, and, with the approval of the officers of the College, some necessary readjustments were made. It is now more generally recognized that the proper servicing of a research library—without which service the collections are not usable—requires experience and training of a special sort, for which adequate compensation must be forthcoming if the service is to be provided. As medicine itself steadily proliferates, the research libraries which are the keepers of the archives do likewise, developing new techniques, demanding more and more training and skill on the part of those who make them function. Almost within a generation, librarianship has developed from casual, individualistic, not very serviceable methods into a highly organized skill that, at its best, makes an enormous contribution to orderly progress. The transition from the old ways to the new is always more difficult for the long-established institution to encompass; but the institution's life of usefulness is directly measured by its ability and willingness to meet the functional tests of the changing days. In the library world (as elsewhere) salaries now bear a more direct relationship to our general competitive economy—an inescapable conclusion that, in the past year, we arrived at the hard way.

Without the special skills and sportsmanship of the Misses Manson, Yarger, Haegele, and Mary Mars—not to mention the patience and understanding of our constituents—this report would be a very much sadder one.

Miss Manson, in addition to her splendid work in classifying or reclassifying, and cataloguing, an immense amount of valuable old material that her department inherited, served as a member of the Hospitality Committee of the Special Libraries Council during the annual meeting of the Special Libraries Association here in June (one of the conferences being held in our building), and subsequently was made chairman of the Council's membership committee.

The librarian served as president of the Philadelphia Metropolitan Library Council; as secretary of the American Association of the History of Medicine; as a member of the Public Documents Committee of the Medical Library Association. As an alternate delegate from the last Association, he attended meetings, in Philadelphia and New York, of the Joint Committee on Books for War Devastated Libraries. He continued to edit the College's *Transactions & Studies* and to serve as secretary of its Hall Committee. To the *Bulletin of the Medical Library Association* he contributed an article entitled "Literary Qualities of Some American Medical Classics"; and to the *Essays in the History of Medicine Presented to Professor Arturo Castiglioni*. . .an essay (jointly with Dr. Edward B. Krumbhaar) entitled, "Angina Inflammatoria (Diphtheria?) As Described in David Orme's Edinburgh Dissertation (1749) and Benjamin Morris' Leyden Dissertation (1740)."

Inventory

	1944	1943	1944	1943
Total number of accessioned[1] items			161,740	160,712
Incunabula	415	414		
Manuscripts (including a few typescripts)	634	631		
Other items	160,691	159,667		
	161,740	160,667		
Total number of unaccessioned[2] items			318,353	321,191
Reports and Transactions (annual or occasional)	25,819	25,786		
Periodicals "reserve"[3]	4,701	4,694		
Complete and incomplete volumes of other periodicals not regularly received	2,673	2,664		
Theses and Dissertations	48,273	47,696		
Pamphlets (fewer than 100 pages)	236,887	240,351		
	318,353	321,191		
Total number of current periodical publications regularly received			724	701
Duplicate books			4,486	14,430
Portraits[4]			60,822	57,750

Distribution of This Material

	Accessioned Items	Unaccessioned Items
General Library (including the Lewis Library)	157,514	317,349
On permanent deposit:		
Gross Library	3,809	4
Parry Library of the Obstetrical Society of Philadelphia	217	0
Mütter Museum[5]	200	0
	161,740	318,353

Current Periodicals

(Census by country)

Country	Total	Purchased	Exchanged	Gratis
North America				
Canada	19	1	9	9
U. S. A.	471	190	84	197
So. America, etc.				
Argentina	25	8	9	8
Brazil	19	2	10	7
Chile	3		1	2

[1] An accessioned item may be any kind of material that is kept within covers, whether these be made commercially or in the library, of paper or of more durable material. The accessioned item might comprise, for instance, part of a book, or one or more books; a part of a periodical volume, or one or more complete volumes; reports, pamphlets, or theses, single or collected; an atlas or photographed album, collection of correspondence, etc.

[2] While the accessioned items contain some material in paper covers, it should be noted that most Reports and Transactions, pamphlets, and theses, also paper-covered, are not accessioned, but that any of them might be, if any intrinsic reason for so doing should present itself.

[3] More-or-less complete duplicate volumes of important and much-used periodicals.

[4] Including 111 oil, and 465 other, framed portraits in the care of the Committee on College Collections. The count of portraits represents the number of entries on the cards in the portrait catalogue. The entries represent, in turn, both loose portraits and those in books, many of them, of course, being merely different reproductions of a single original. It does not include the approximately 2,800 photographs in the Bradley Collection, nor hundreds of portraits in the Sturgis Collection, now in process of being catalogued.

[5] The books of the Mütter Museum are not permitted to be removed from the College building.

Country	Total	Purchased	Exchanged	Gratis
Peru	1		1	
Uruguay	2		2	
Venezuela	2	1		1
Guatemala	2			2
Mexico	15	2	7	6
Cuba	14		4	10
Puerto Rico	1		1	
EUROPE				
Eire	1	1		
France	6	6		
Germany	17	17		
Gt. Brit.				
England	80	58	15	7
Scotland	2	2		
AFRICA				
British	4		3	1
French	2		1	1
ASIA				
Ceylon & India	10	2	6	2
PACIFIC AREA				
Australia & N. Z.	5	1	3	1
Hawaii	1	1		
Total:	724	314	156	254
1943 Total:	701	291	133	213
1939 Total:	1,202	688	248	266
Annuals				
Total:	31	13	5	13

Foreign titles: The war is still reflected in our foreign list, with but few countries represented, and again Latin America predominating. Certain German and French periodicals continued to be reproduced and made available. Switzerland and Eire were the only European neutrals that sent through any current issues.

New Titles: There were 48 periodicals and one annual added to our list in 1943–44. Of these 18 were purchased, 6 offered in exchange, 24 presented as gifts (or free); 21 of these begin with the first volume, and 9 started publication in 1944.

Separate issues received, checked-in on cards, and shelved 7,161. Duplicates presented by Fellows, other donors, or from different sources, 4,096; Reserves, 281.

Visitors to the Norris Room totaled 3,118 for the year, 470 for the 67 evenings the library was open.

READERS' USE OF THE LIBRARY

Library hours: From October, 1943, through January, 1944, we maintained our customary schedule of hours for the academic year; that is, we were open weekdays from 9 to 6 (Mondays and Wednesdays to 9:30 p.m.), and on Sunday afternoons from 2 to 5:30. In February, the loss of two important members of the staff, and our inability to make replacements, necessitated a curtailment of the schedule as follows: the Monday evening and Sunday afternoon hours were eliminated entirely, and on Wednesdays we did not open until 1. This schedule was maintained until June 5th, when the summer schedule (Mondays, Tuesdays, Thursdays, Fridays, 9 to 5; Wednesdays, 1 to 9:30) began; this was in force until after Labor Day, when we returned to the February to June schedule. The library was closed, as usual, on the following legal holidays: Thanksgiving, Christmas, New Year's and Labor Days.

Number of visitors:

			Fellows		Non-Fellows		Totals	
	1944	*1943*	*1944*	*1943*	*1944*	*1943*	*1944*	*1943*
Days	(286)	(294)	1,172	1,057	6,560	5,137	7,732	6,194
Evenings	(68)	(101)	136	77	964	1,063	1,100	1,140
Sundays	(16)	(33)	15	39	169	386	184	425
			1,323	1,173	7,693	6,586	9,016	7,759

Circulation of books:

	1944	1943
Number of volumes taken out	5,707	5,319
(Books: 2,552; Periodicals: 3,155)		
Number of volumes consulted in the library[6]	29,077	30,460
(Books: before 1700, 115; 1701–1850, 201; after 1850, 7,525)		
(Periodicals: before 1850, 197; 1851–1899, 437; after 1899, 20,602)		

Inter-library loans: The library has sent 267 (1943: 160) volumes on inter-library loan to 55 (1943: 27) libraries in 13 (1943: 10) States and has borrowed 17 (1943–4) volumes from 6 (1943: 1) libraries. There were, as happens each year, a number of requests we could not fill; 19 volumes asked for we did not have; 13 were on the restricted list; 21 requests were for current unbound journals. Our photostat answered the need in some of these cases; in many cases a knowledge of this service obviously forestalled a request for loan of a volume.

Photostats: 869 photostatic prints have been furnished to Fellows (1943: 2,009); 1,343 prints to non-Fellows (1943: 351) 263 prints to the library (1943: 275).

Acquisitions and Accessions

Received from all sources:[7]

1944: 1,057 volumes (including the bound and accessioned volumes of periodicals, 33 unbound reports and 45 duplicates); 615 pamphlets; 577 theses; 5,340 numbers of various journals.

1943: 1,840 volumes (including the bound and accessioned volumes of periodicals, 142 unbound reports and 175 duplicates); 444 pamphlets; 209 theses; 17,566 numbers of various journals.

Accessions:

1944: 979 volumes (586 by purchase; 316 by gift; 77 by exchange). (Books, 539; Periodicals, 440).

1943: 1,523 volumes (790 by purchase; 530 by gift; 203 by exchange). (Books, 805; Periodicals, 718).

Donations

The individual donors for the past year number 216 (1943: 199). The library is indebted for large gifts of books, pamphlets, and unbound periodicals to the following donors:

Boston Medical Library; Drs W. N. Bradley, J. B. Carson, B. Chance; F. A. Davis Co.; Drs E. J. Donnelly, W. A. N. Dorland, G. M. Dorrance, R. J. Hunter, E. B. Krumbhaar; Lea & Febiger; Dr F. H. Leavitt; Medical Library Association Exchange; Dr H. Morris; Pan American Sanitary Bureau; W. B. Saunders Co.; Dr T. G. Schnabel; South African Institute for Medical Research; University of California, Institute of Experimental Biology; University of Pennsylvania Library; University of Pennsylvania School of Dentistry; Dr J. Walsh; Western Reserve University; John Wyeth & Bro., Inc.; Dr W. Zentmayer.

Various publishing houses have presented volumes as follows: P. Blakiston's Son & Co., 1; F. A. Davis Co., 8; Lea & Febiger, 7; J. B. Lippincott Co., 14; Liveright Publishing Corp., 1; W. B. Saunders Co., 43.

Fifteen volumes were presented by the following authors or editors: J. L. T. Appleton, M. A. Castallo, E. G. Conklin, R. Friedman, B. L. Gordon, J. Hoffman, J. H. Hutton, C. E. Krausz, P. G. Kreider, H. W. Orr, J. F. Ritter, E. B. Spaeth, B. Spector, J. M. Thorington.

Other individual donors were as follows: Drs F. H. Allen, M. L. Anfenger, J. H. Arnett; Mr J. R. Bahl; Dr W. S. Bainbridge; Mr R. H. Baugh; Drs F. Beekman, M. Behrend, M. S. Biskind, W. G. Bowerman; Hon. C. L. Brown, President Judge; Drs W. W. Cadbury, W. K. Campbell, T. S. Cullen, C. Dennis, D. Denny-Brown, L. A. Erf, C. B. Farr, H. M. Fisher, M. F. Fowler, F. G. Fox; Mrs B. Glaessner; Drs H. Goldstein, H. Goodman; Mr H. G. Goodman; Dr F. M. Groedel; Mr D. D. Grubbs; Drs E. Halpin, A. E. Hertzler, W. L. Holt, P. B. Hughes, W. E. Hughes, C. L. Jackson, S. Kardimon, J. V. Klauder, A. Koerner, H. M. Langdon; Major J. E. Leach; Drs W. G. Leaman, jr., M. J. Lewis, A. Malloch, T. H. McGavack, T. G. Miller; Mrs A. Newlin; Drs W. R. Nicholson, H. R. Owen, E. C. Padgett; Miss S. C. Partenheimer; Drs O. H. Perry Pepper, G. M. Piersol, H. Roesler, H. C. Ruche, L. C. Scheffey, F. I. Seymour, R. H. Shryock, L. Taran, R. J. Terry, L. Thorndike,

[6] The number of volumes "consulted in the library" includes only those supplied on demand. Readers have access to the bound volumes of periodicals and reference works kept on the shelves in the Reading Room; the Fellows, and occasionally others, by special permission, have access to the book-stacks. There are, therefore, many volumes consulted of which no accurate record can be kept.

[7] As usual, not all the pamphlets, theses, and numbers of various journals listed as received had been checked for keeping or discard at the close of the library year.

B. Tucker, G. Tugendreich, E. Urbach, H. R. Viets; Mrs E. Wade; Dr. N. S. Yawger.

Exchanges

The *Transactions & Studies* was sent, either as gift or in exchange for 144 other serial publications, to 295 organizations.

The library has received 194 journal issues through the Medical Library Association Exchange.

Theses and dissertations to the number of 75 have been received from the following European schools of medicine with which we exchange publications at the present time: Universities of Bern, Geneva.

Work of the Cataloguers

	1944	*1943*
Accessioned items catalogued or recatalogued	790	963
Unaccessioned pamphlets and Fellows' reprints catalogued by author or by author and subject	1,681	1,762
Reprints (from journals not in the library) entered under the name of the journal (periodicals catalogue)	97	52
Cards typewritten, examined and filed	14,582	15,220
Cards revised, typewritten, examined and filed	3,377	5,485

W. B. McDaniel, 2d
Librarian

Approved:
William Egbert Robertson
Chairman

APPENDIX TO LIBRARY REPORT

Second Report of the Honorary Director of the Department of Medical Art

Library Committee
The College of Physicians of Philadelphia

Gentlemen:

Permit me to present this report of the activities of the Department of Medical Art. On June 2, 1943 a detailed report was presented[8] outlining in a general way the methods of assembling the diversified material entrusted to this Department. At that time the physical labor of matting of the material was being performed. This entailed much time and effort but has been accomplished. Cataloguing became the next problem. During these times of shortage of labor this part of the work has proceeded slowly. I have employed a typist who has given practically whole time to the preparation of catalogue cards accurately describing each individual print, photograph, etc. This typist had to be trained in the methods of describing material of this type. The print and photograph portfolios have been completely described on regulation catalogue filing cards. The historical material remains to be catalogued, and this work is continuing without interruption.

This Department has been most fortunate in the acquisition of material since the last report. Unquestionably many of the donors have been stimulated to make these contributions, appreciating that the College is exerting special effort for the preservation and care of this interesting medical material. Brief descriptions of several of these acquisitions follow.

In October 1943 Dr. E. B. Krumbhaar made a most satisfactory contribution. This included 80 portrait prints and 49 original photographs together with historical material, several caricatures, and lastly, several certificates and diplomas of Dr. Krumbhaar.

In March 1944 Dr William Pepper made a generous donation to the College. This included 118 new portrait prints; 17 portrait prints which replaced poorer prints in our collection; 22 photographs; historical prints of hospitals, medical buildings, etc. This accession was especially pleasing since many of the portraits carried autographs of presentation to the Drs. William Pepper. Additionally, from both the Krumbhaar and Pepper accessions, many duplicates were received, which have been of great value for exchange.

In April 1944 I made a visit to the Army Medical Library in Washington, D. C., and obtained from Colonel Harold Jones by exchange the duplicate portrait prints and photographs from the files of the Army Medical Library. This material was carefully checked with our collection, and as a result we obtained 541 new portrait prints; 48 portrait print replacements; 65 original photographs; and 104 miscellaneous reproductions. In this material were large photographs of Surgeon Generals Barnes, Ireland, etc. Hence this accession added special material to our growing collection.

In addition to the above three donations, we have received much material. Dr. J. Monroe Thorington presented portrait photographs and many original drawings of the eye. Miss S. C. Partenheimer presented a set of matriculation and admission cards to

[8] Printed in the *Transactions & Studies*, June, 1943.

courses of Dr. John R. Partenheimer for the years 1870–71–72. Special mention must be made again of Fellows of the College who are constantly donating material to the College, i. e., Drs. Francis R. Packard, William N. Bradley and Burton Chance. Several Fellows have presented their own photographs.

From the three major donations noted above there have been added to the collection 804 portrait prints and 136 original photographs. This has been a remarkable addition as compared to our previous holdings of 1352 portrait prints and 1071 original photographs. Hence, during the past two years, which would include the gift of 400 portrait prints by Dr. S. McC. Hamill, the collection has been more than doubled in size. Again these gifts were valuable as most of the material had been collected during earlier decades of medicine in Philadelphia.

In September 1943 mimeographed letters were forwarded to the Fellows of the College requesting:

1—Photographs of each Fellow.

2—Photographs of other physicians.

3—Miscellaneous medical historical material.

The failure of response to this request can only be explained by the inability of the Fellows to respond on account of the weight of other duties during these trying times. However, I feel that it should be made the duty of each Fellow to file with the College his photograph bearing date and autograph. At this time a special request is made of all Fellows in the Armed Services to forward to the College autographed photographs in uniform.

It might be of interest to note that this collection has been of practical service. Material from this collection has been supplied on many special requests. You will note in "Victories of Army Medicine" by Edgar Erskine Hume reproductions of several portraits from this collection. Also, on occasions, appropriate material has been exhibited at the College.

I hope that the Library Committee appreciates the tediousness of this work and will bear with me at this time, realizing that I am most actively engaged in the general practice of medicine. As a matter of record for the College, this work has been performed with no financial expenditure by the College. The cooperation of Dr. W. B. McDaniel, 2d has been of greatest assistance to me at all times.

Respectfully submitted

Samuel B. Sturgis
Honorary Director,
Department of Medical Art
The College of Physicians
of Philadelphia

Annual Reports of the Committees of the Mütter Museum and College Collections

The Museum

The Museum was open to Fellows of the College, physicians, and the general public on all days when the College Building was open from 10–1 and from 2–6, except Saturdays when the hours were from 9–1. During these hours the curator and clerk-technician was in constant attendance, moreover the Museum was open on the evenings of the Stated Meetings of the College and at some of the Sectional Meetings of the College. The curator reports that there were an unusual number of visitors to the Museum during the year, 646 of whom signed the Register.

The Fifty-sixth Thomas Dent Mütter Lecture was given by Dr. Virgil H. Moon, Professor of Pathology, Jefferson Medical College, who spoke to a large and attentive audience on "The Dynamics of Shock and Its Clinical Implications." The lecture was published in the Transactions and Studies of the College in the December 1943 issue.

During the year the Honorary Curator of the Museum, Dr. Joseph McFarland, visited Central America, Mexico and Cuba. A paper entitled "Log of a Flying Visit to Central America, Mexico and Cuba" appeared in the Transactions and Studies of the College, April 1944.

Two papers based on the activities of the Mütter Museum and its Collections were written by Mrs. Ella N. Wade, curator: "Visitors to the Mütter Museum," Transactions and Studies of the College, April, 1944; "Concerning a Japanese Physician's Honorary Sword," Transactions and Studies of the College, June 1944.

Use was made of the permanent specimens and collections of the Museum by teachers of the several medical schools and colleges of Philadelphia in presentations before medical students.

Dr. Joseph McFarland was again appointed Honorary Curator of the Mütter Museum, and Mrs. Ella N. Wade, curator and clerk-technician.

The permanent collection of the Mütter Museum now numbers more than 7200 items. These specimens have been carefully catalogued and are available for study within the Museum. The collection consists of important dry and wet anatomical specimens of varied kinds; pathological and anthropological specimens; osteological specimens exhibiting war injuries; illustrative specimens in the several special branches in medicine; models; many instruments, most of which are of great historical interest; and a number of valuable special collections, exhibiting normal and pathological anatomy.

Accessions to the permanent collection of the Mütter Museum for the year 1943–44 and falling under the provisions of the Mütter Deed of Gift are as follows:

Hemoglobinometer, after Fleischl's model
  Presented by Miss Josephine Henry.
Vaccination outfit
  Presented by Dr. Randle C. Rosenberger.
Dudgeon's sphygmograph
  Presented by Dr. Philip Reichert.
Sma l pewter syringe
Scarificator
  Presented by Dr. T. Grier Miller.
Box of Molesworth's uterine dilators
  Presented by Dr. William N. Bradley.
A Morton's ophthalmoscope
  Presented by Dr. William Zentmayer.
Probe
Dressing forceps
Tenaculum forceps
Hour-glass, at one time used for taking the pulse of Dr. Thorington's father while he was in Amsterdam.
  Presented by Dr. J. Monroe Thorington.

The College Collections

Dr. Joseph McFarland was reappointed Honorary Custodian of College Collections for the year 1943–44, and Mrs. Ella N. Wade, Custodian and Clerk-technician.

The portrait of Dr. William Thomson was loaned to the Philadelphia Museum of Art for an exhibit of the paintings of Thomas Eakins held at the Museum of Art from April 8 to May 14, 1944.

Permission was granted to Mr. Arthur I. Meigs, to remove the portrait of his father, Dr. Arthur V. Meigs, from Mitchell Hall, for the purpose of having it copied by S. George Phillips, artist.

Some interesting and valuable medals for addition to the permanent collections were obtained

through exchange for duplicate medals in possession of the College.

The Eakins portrait of William Thomson was reframed and certain other portraits were relabeled following investigations bearing on the authenticity of the portraits and the artists.

Accessions to the College Collections were as follows:

Pap boat or feeding dish
Presented by Dr. O. H. Perry Pepper.

Blood donor's button
Presented by Miss Clara Manson.

Dental stone copies of the following medals:
Dr. Charles Michel Billard (bronzed)
Dr. Harvey Cushing
Dr. Karl Weigert
Dr. Ernst Fuchs
Dr. François Magendie (bronzed)
Presented by Major Harry A. Davis, Army Medical Museum, Washington, D. C.

Small urn used to contain locks of hair or other mementos, at one time the property of Dr. S. Weir Mitchell. It was presented to Dr. Packard by the widow of Dr. Mitchell's son, Dr. John K. Mitchell, who had Dr. Packard's name added to the five names already engraved on the urn, before giving it to him. The names on the urn are:

I. [-J.] Fothergill, Jos. Parrish, Geo. B. Wood, H. C. Wood, S. W. Mitchell, Francis R. Packard.

Bronze medal of Gustav Killian, 1907
Presented by Dr. Francis R. Packard.

Badge of the Centennial Meeting of the American Psychiatric Association, Philadelphia, May 1944.
Presented by W. B. McDaniel, 2nd.

The following busts by Samuel Murray:
Dr. James Tyson
Dr. James Cornelius Wilson (small bust)
Dr. James Cornelius Wilson (large bust)
Presented by Mrs. Samuel Murray through Dr. William N. Bradley.

Cut of the bronze medal presented to Dr. Samuel McClintock Hamill for notable service and achievement in the field of Child Health, 1933.

Lead medal of the Philadelphia Pediatric Society
Presented by Dr. William N. Bradley.

Six British war medals issued to medical personnel, from the collection of Colonel Robert H. Firth, consisting of:—
Ghuznee 1839—an Indian campaign medal
China 1842
South Africa 1853
Crimea, one bar Inkerman 1854
Afghan war 1878–80 with two bars, Charasia and Kabul
Army of India 1799–1826, one bar Ava.
Presented by Dr. Edward F. Corson.

Framed painting of the first home of the College of Physicians in the old College of the University of Pennsylvania, 1787–1791.
Presented by Dr. Balduin Lucké.

Three-month fetus. Mother, married, white, age 33. This is the second abortion at third month. Prepared by Captain Holcomb.
Presented by Captain R. C. Holcomb, M. C., U.S.N. (Ret.)

The following medals were received from the Army Medical Museum in Washington, in exchange for nine duplicate American Medical Association badges in the collection of the College:—
Dr. Edmond Claude Bourru
Johann von Wolfgang Goethe
Dr. John Howard
Sun Yat-sen, commemorating the birth of the Chinese Republic
Famine medal of Halle, Germany, 1846–47
Brussels Plague medal 1667
World's International Dental Congress, Chicago, 1893
United States Red Cross, 1914
International Tuberculosis Congress, Amsterdam, 1832

A paper dealing with the medal collection of the College, including a catalogue of the medals in the Collection, compiled by Mrs. Ella N. Wade, Custodian and Clerk-technician of the College Collections, appeared in the April 1944 issue of the Bulletin of the Medical Library Association.

J. Parsons Schaeffer
Chairman

Annual Report of the Committee on Public Health, Preventive Medicine and Public Relations

Meetings were held jointly with the Committee on Public Health and Preventive Medicine of the Philadelphia County Medical Society, at approximately bi-monthly intervals.

The Housing situation in Philadelphia was the main subject of a meeting to which were invited Leighton P. Stradley, Esquire, Counsel, Mr. Edmund N. Bacon, Managing Director, and Miss Florence T. Conlen, Educational Assistant in the Philadelphia Housing Association and Mr. Herbert Packer, Chief, Division of Housing and Sanitation of the Department of Public Health.

The committee was fully informed through these guests of the problems and difficulties that are faced in the matter of financial support, available personnel and the practical development of their program. The committee was impressed with the aims and efforts of the Division of Housing and Sanitation of the Department of Public Health and the Philadelphia Housing Association. This appreciation was openly expressed by the committee and its support was pledged to aid them in any way possible to secure adequate funds from the City Council for their work.

The committee agreed in particular to undertake in any way possible to educate physicians on matters pertaining to the sanitary code, especially to inform them how to recognize and report infractions of the code when they see them in their attendance on patients in their homes.

Throughout its winter meetings the committee discussed and sought ways and means of utilizing the College of Physicians of Philadelphia and the Philadelphia County Medical Society as sources of opinion and pressure to use their influence in the appointment or election of persons to public offices which involve the medical profession and public health.

The question of the Rat Menace in Philadelphia was discussed in its relationship to pub ic health and the material damage to housing and commodities. It was decided to request Dr. Rufus S. Reeves, Director of Public Health, to arrange for Mr. Herbert Packer, Chief of the Division of Housing and Sanitation, to meet with the committee and outline the program of rat control now in operation and what the committee might do to cooperate.

Mr. Packer met with the committee in April and gave a comprehensive picture of what is being done and the extent of the menace. It is obvious that little was known as to the actual extent to which the rat menace is a hazard to public health in Philadelphia. It is the opinion of the committee that this should be studied by competent authorities.

Aside from extending rat control it seemed to the committee that education of the public is of prime importance. It was suggested that the possibility of utilizing the services of Boy Scouts and Messenger Boys in rat elimination be investigated. The committee also expresses its thanks to Mr. Packer for giving so willingly of his time and knowledge on these important health problems.

At its meeting in June the committee received a request from the Philadelphia Heart Association through Dr. Ella Roberts to consider the advisability of having Rheumatic Fever added to the list of diseases reportable to the Department of Health and to use its influence in having this done.

The following six points summarize the advantages to be expected from placing Rheumatic Fever on the Reportable Disease list:

1. A Public Health record clarifies it and makes it more definite to the family and the physician.

2. Statistics will be available showing how many cases there are in the community.

This advantage was open to question as the figures obtained will be only those reported and it is questionable whether all physicians will take the trouble to send in reports.

3. Statistics will reveal the present need for care based on the volume in the community.

4. Age groups involved and the types of facilities needed to care for various age groups will be uncovered.

5. Physicians will pay more attention to the disease when it is a reportable one.

6. Rheumatic Fever is a contagious disease and as such is a public health menace. Approximately

200 acute cases exist in the Philadelphia Public Schools today getting home treatment, according to Dr. Owen.

It was felt by the committee that before any action was taken, it should have information of the experience of other cities where reporting already is in effect. Dr. Roberts was asked to gather this information.

Attention was called by Dr. Hubley R. Owen to a proposed ordinance for the licensing of institutions maintaining day care for children. The chairmen of the College of Physicians and County Medical Society committees were empowered to appoint a small committee to discuss this matter with the proper authorities and especially Judge Vincent Carroll and Michael Francis Doyle.

At this meeting your committee had before it the report on the Evaluation of health facilities in Philadelphia made by the American Public Health Association.

It was felt that the appraisal form of the report was not a fully satisfactory one and the survey was too hurried and objective. Resources available seemed to be emphasized more than performance attained. It seemed to the committee however that the report offered a splendid opportunity to Dr. Reeves to present the City Council with concrete data when asking for adequate funds for his department. It was decided to ask Dr. Reeves how he wants this committee to assist his department in any plans he may formulate based on results of the survey.

The meeting in December was called at the request of Abbotts Dairies for the purpose of informing the committee regarding the methods used in Philadelphia to safeguard the quality of grade A milk.

Several members of the Abbotts Dairies' staff were present and gave historical and practical data on the production of grade A milk, its relation to certified milk and grade B milk.

Facts and figures were presented to show the importance of grade A milk in its more sanitary production and higher butter fat content. About 20% of the milk sold in Philadelphia is grade A, ½ of 1% is certified and the rest is B milk whose butter fat content is fixed at 3.7%.

The real purpose of the visit became evident towards the close of the meeting when the Abbott representatives pointed out that the State Health Advisory Board is considering a definition of "A" milk and it was hoped that by our sanction official recognition might be given to "A". However, no action was asked for at present, since a public hearing on the subject wi l probably be held in the near future.

MAURICE S. JACOBS
*Acting Chairman**

* In the absence of the chairman, Joseph Stokes, Jr, on an assignment overseas.

Annual Report of the Publication Committee

This report covers the four numbers of the *Transactions & Studies* published within the College's fiscal year ending November 30, 1944—namely, vol. 11, nos. 3 and 4; vol. 12, nos 1 and 2.

The total number of pages printed was 162, nine fewer than the number contained in the preceding four issues.

It seems proper to refer again to the changed conditions brought about by the war as regards the reservoir of scientific material available to the committee. In 1939, for instance, the various lectureship Funds provided eight lectures, all of which were duly published in the *Transactions & Studies*. In the period covered by the present report, during which our scientific meetings were held jointly with the County Society, only four of these eponymous lectures were given; fortunately, all were available for publication. The remaining four lectures in the series were, of course, provided by the County Society, with whom we have a cordial arrangement which permits both bodies to publish the available joint lectures. Unfortunately, two of the lectures provided by the Society were, for military reasons, unavailable for publication. The other two were published in the respective organs of both bodies. (While the duplication is regrettable from some points of view, it is regarded as a wartime measure made less reprehensible by the fact that County Society publications are not regularly analyzed by the indexes, and thus the papers become generally accessible only through their appearance in the *Transactions & Studies*.) As it became evident early in the season that the supply of scientific material was to be reduced, we were able to make an adjustment that put perhaps the best face possible on the situation: three of the issues were brought out with their normal quota of scientific and historical material, while the fourth was confined to College 'yearbook' material. Under the circumstances, it seems surprising only that there was not a greater reduction in the number of printed pages.

We were fortunate in being able to offer Prof. Faust's Alvarenga Prize Lecture, and the Mütter, Hatfield, and Newbold Lectures by Drs. Moon, Toomey, and Eugene M. Landis, respectively; and to have available the papers of Dr. Cyrus C. Sturgis and the seven participants in the symposium on the early diagnosis of cancer.

These are not days when *Clio Medica* is being wooed very assiduously, of course. Nevertheless, it has been possible for us to bring out historical studies on our own Section on Otolaryngology and on the Obstetrical Society of Philadelphia written by Fellows of the College. Another Fellow, Dr. Cadbury, gave us a bit of contemporary history in his "Doctors on Board the Motorship Gripsholm." And the facile and flavorous pens of the Curator and the Honorary Curator of the Mütter Museum have not failed to produce their usual quota of articles bringing us—in rare combination—both enjoyment and useful information.

With some trepidation (and occasional anguish) the editor has adhered to the policy of not editing. That is, he permits the papers to appear in their native state, without imposing on them his personal code of literary law and order. He is perfectly aware that, by doing so, he is subjecting himself to possible present and future misunderstanding. But he feels very strongly that an author has an inalienable right to express himself as he sees fit—and that there is historical value in permitting him to do so. Present and future readers of the *Transactions & Studies* may confidently assert that the papers appearing therein represent accurately the way their distinguished and less distinguished authors really wrote—not necessarily the best they were capable of, but at least the literary craft on which they were willing to float down to posterity. One main exception is made: the editor does not alter the form of references, but he makes every possible effort to have the details accurate.

Despite all its trials and deficiencies, the *Transactions & Studies* has continued to bring to the library, via exchange arrangements, many useful periodicals that would doubtless not otherwise be available anywhere in this area. And what is quite as important, it has carried on its other main function—that of serving as a unique channel of

communication between the College and its Fellows, between the College and the world beyond—in space and time.

A financial summary follows:

	Receipts	
Appropriation.....	$550.00	
Income from publication funds.....	671.25	
Sale of T & S and reprints.....	129.73	$1,350.98

	Expenditures	
Printing, mailing, and reprints.....	$1,226.38	
Stenciling envelopes.	19.88	
Miscellaneous.....	8.66	1,254.92
Balance, November 30, 1944.....		$96.06

W. B. McDaniel, 2d
Editor

Approved:
John Porter Scott
Chairman

Transactions of the Sections

SECTION ON GENERAL MEDICINE

Meeting, October 23, 1944

Constrictive Pericarditis of Tuberculous Origin. Maurice S. Jacobs, M.D., and W. Emory Burnett, M.D. (Commentator: Hugo Roesler*, M.D.)

Relation of Hodgkin's Disease to Lymphosarcoma and Reticulum Cell Sarcoma. Peter Herbut, M.D., F. R. Miller*, M.D., and L. A. Erf*, M.D. (Commentator: E. B. Krumbhaar, M.D.)

Pathogenetic Mechanisms in Hemolytic Anemias. William Damashek*, M.D.

Joint Meeting[1], *November 27, 1944*

Significance of Lengthening of the Q-T Segment in the Electrocardiogram. Samuel Bellet*, M.D., and Thomas McMillan, M.D. (Commentators: C. C. Wolferth, M.D., and Thomas Durant, M.D.)

Penicillin in the Treatment of Subacute Bacterial Endocarditis. William G. Leaman, Jr., M.D., Edward G. Muhly*, M.D., Bernice Durgin*, M.D., and Nellie T. Watts*, Ph.D. (Commentators: Harrison F. Flippin, M.D., and William D. Stroud, M.D.)

Experimental and Clinical Studies of Bacterial Endocarditis. Ward J. MacNeal*, M.D.

SECTION ON OPHTHALMOLOGY

Special Meeting, October 19, 1944

Informal dinner in honor of William Zentmayer, M.D.

Meeting, November 16, 1944

Some Considerations of Unilateral Exophthalmos. Edward C. Ellett*, M.D. (The Seventh annual de Schweinitz Lecture.)

Meeting, December 21, 1944

Suprasellar Tumors with Scotomatous Field Defects. Bernard J. Alpers, M.D., and N. S. Schlezinger*, M.D.

Penetration of Penicillin into the Rabbit's Eye with Normal, Inflamed, and Abraded Cornea. Irving H. Leopold, M.D., and William O. LaMotte, Jr., M.D.

Syphilitic Iritis with Particular Reference to the Herxheimer Reaction as a Diagnostic Aid and Response to Different Treatment including Penicillin. Joseph V. Klauder, M.D., and George J. Dublin, M.D.

SECTION ON OTOLARYNGOLOGY

Joint Meeting[2], *October 18, 1944*

Aural Rehabilitation of the Navy. The General Nature of the Rehabilitation Program, the Present Operations, and the Future Rehabilitation Service. Francis L. Lederer, Lt. Comm., (MC), U.S.N.

The General Philosophy Guiding the Navy Service to the Aural Casualty. H. Koepp-Baker, Lt., (MC), U.S.N.

The Methods for Determining the Needs and Abilities of the Patient. J. R. Knott, Lt. (j.g.), (MC), U.S.N.

The Techniques of Audiometric Service and the Fitting of Hearing Aids. Eva Thompson, A.B.

The Re-education Program for Aural Casualties including Speech Reading and Speech Corrections Service. Miriam Pauls, Lt. (j.g.), (MC), U.S.N.

Joint Meeting[2], *November 15, 1944*

Notes on the Academy Meeting. Benjamin H. Shuster, M.D.

The Value of Barany and Galvanic Tests in Labyrinthine and Intra-Cranial Pathology in the Presence of Suppurative Otitis-Media. Burech Rachlis, M.D. (Commentators: Matthew S. Ersner, M.D., and Ernest A. Spiegel, M.D.)

The Chronic Discharging Ear—Its Problems and Its Management. Abram H. Persky, M.D. (Commentators: George M. Coates, M.D., and Horace J. Williams, M.D.)

A Comprehensive Routine for Hearing Testing. Douglas Macfarlan, M.D.

* *By invitation.*

[1] With the Philadelphia Heart Association.

[2] With the Philadelphia Laryngological Society

Joint Meeting[2], *December 20, 1944*

MEMOIR OF THE LATE DR. WALTER HUGHSON[3]. William Hewson, M.D.

EXTRA LARYNGEAL ARYTENOIDECTOMY FOR BILATERAL ABDUCTOR PARALYSIS. Henry Boylan Orton, M.D. (Commentator: Louis H. Clerf, M.D.)

[3] *Transactions & Studies*, February, 1945.

LARYNGEAL PARALYSIS FROM INNOMINATE ANEURISM. Joseph P. Atkins, M.D. (Commentator: Oscar V. Batson, M.D.)

HEPARIN TREATMENT OF CAVERNOUS SINUS THROMBOSIS, WITH REPORT OF A CASE. Robert Welty, M. D. (Commentator: Karl M. Houser, M.D.)

List of the College Lectures, 1943-1944*

1943

January 13

JONES, STANHOPE BAYNE-. Tetanus.

February 3

COLONNA, PAUL C. The Role of Surgery in the Chronic Arthritic Patient (Nathan Lewis Hatfield Lecture XXVII). (*Transactions & Studies*, April, 1943.)

March 10

RHOADS, C. P. Newer Advances in Cancer Research.

April 7

SCHMIDT, CARL. Some Physiological Problems of Aviation (Mary Scott Newbold Lecture LIII). (*Transactions & Studies*, June, 1943.)

May 12

ELIASON, E. L. A Saga of Fracture Therapy (J. Chalmers Da Costa Oration, The Philadelphia County Medical Society). (*Transactions & Studies*, June, 1943.)

September 15

PAULLIN, JAMES E. The Obligation of American Medicine in Post-war Planning.

October 13

FAUST, ERNEST CARROLL. Some Modern Conceptions of Amebiasis (Alvarenga Prize Lecture IV (Award XXXVIII)). (*Transactions & Studies*, December, 1943.)

November 10

RANKIN, FRED W. Peptic Ulcer in the Army.

December 1

MOON, VIRGIL H. The Dynamics of Shock and Its Clinical Implications (Thomas Dent Mütter Lecture LVI). (*Transactions & Studies*, December, 1943.)

1944

January 12

STURGIS, CYRUS C. A Study of the Incidence of the Commoner Types of Anemia, Their Cause and Treatment. (*Transactions & Studies*, April, 1944.)

February 2

TOOMEY, JOHN A. Observations on the Treatment of Infantile Paralysis in the Acute Stage (Nathan Lewis Hatfield Lecture XXVIII). (*Transactions & Studies*, April, 1944.)

March 8

Symposium on the Early Diagnosis of Cancer. (*Transactions & Studies*, June, 1944.)

April 5

LANDIS, EUGENE M. The Hypertension Problem (Mary Scott Newbold Lecture LIV). (*Transactions & Studies*, June, 1944.)

September 13

SMITHWICK, R. H. Some Experiences with the Surgical Treatment of Hypertension in Man. (*Transactions & Studies*, December, 1944.)

October 4

ENDERS, JOHN F. Immunity in Mumps. (To be published in the *Transactions & Studies*, 1945.)

November 8

IVY, A. C. The Gastrointestinal Hormones: Their Physiology and Application. (*Transactions & Studies*, December, 1944.)

December 6

REIMANN, STANLEY P. The Cancer Problem As It Stands Today (Thomas Dent Mütter Lecture LVII). (To be published in the *Transactions & Studies*, 1945.)

* Held jointly with the Philadelphia County Medical Society. The lectures on Feb. 3, April 7, Oct. 13, and Dec. 1, 1943, Feb. 2, April 5, Oct. 4, and Dec. 6, 1944, were delivered at the College. The other lectures were delivered at the County Society.

LIBRARY OF THE
COLLEGE OF PHYSICIANS
OF PHILADELPHIA

Fellows

December 31, 1944

ELECTED

1912. Addison, William H. F., Medical Laboratories, Univ. of Pa.
1926. Adler, Francis Heed, 313 S. 17th St.
1914. Aiken, Thomas G., Berwyn, Pa.
1936. Aldridge, Fred Cutler, Wayne, Pa.
1936. Alexander, Fay Knight, Fitzgerald Mercy Hospital, Darby, Pa.
1906. Allen Francis Olcott, Jr., 2216 Walnut St.
1932. Allen, Frederick H., 1711 Fitzwater St.
1935. Alpers, Bernard J., 111 North 49th St.
1933. Alston, Robert S., 121 Walnut Lane.
1905. Anspach, Brooke M., 1827 Spruce St.
1930. Appel, Kenneth E., 111 N. 49th St.
1905. Appleman, Leighton Francis, 308 S. 16th St.
1935. Armitage, George L., 400 E. 13th St., Chester, Pa.
1922. Arnett, John H., 1804 Pine St.
1942. *Aronson, Joseph D.
1941. *Aronson, Roland S.
1920. Astley, G. Mason, 812 N. 63rd St.
1944. Atkins, Joseph P., 1201 Knox Rd., Wynnewood, Pa.
1935. Atlee, John L., 37 E. Orange St., Lancaster, Pa.
1935. Atlee, John L., Jr., 37 E. Orange St., Lancaster, Pa.
1914. Austin, J. Harold, 821 Maloney Clinic, Univ. of Pa.
1935. Bach, Theodore F., 1900 Rittenhouse Sq.
1942. *Bachman, Carl.
1937. Bacon, Emily P., 2104 Spruce St.
1916. Balentine, Percy L., 407 Weightman Bldg., 1524 Chestnut St.
1898. Balliet, Tilghman M., 3920 Sansom St.
1940. Banes, Charles C. A., 2043 N. 12th St.
1934. *Bank, Joseph.
1940. Barba, Philip S., 222 W. Harvey St., Germantown.
1943. Barden, Robert P., 3400 Spruce St.
1911. Barnard, Everett P., 1820 S. Rittenhouse Sq.
1939. *Barnshaw, Harold D.
1939. Bartle, Harvey Jr., 133 S. 36th St.
1924. Bartle, Henry J., 1930 Chestnut St.
1931. Bates, William, 2029 Pine St.
1932. Batson, Oscar V., 3502 Hamilton St.
1921. Bauer, Edward L., 1609 Spruce St.
1933. Bauer, John T., Pennsylvania Hospital.
1939. Baumann, Frieda, 1930 Chestnut St.
1922. Bazett, Henry C., 629 Haydock La., Haverford, Pa.
1908. Beardsley, E. J. G., 1919 Spruce St.
1930. Beardwood, Joseph T., Jr., 2031 Locust St.
1935. Beerman, Herman, 2422 Pine St.
1932. Behney, Charles A., 3722 Chestnut St.
1942. *Behrend, Albert.

* On active service.

1934. Behrend, Moses, 255 S. 17th St.
1930. Belk, William Parks, Times Medical Bldg., Ardmore, Pa.
1936. Bell, Benjamin Tertius, 1930 Chestnut St.
1943. *Berk, J. Edward.
1941. Bernstein, Mitchell, 1321 Spruce St.
1937. Bertolet, J. Allan, 1530 Locust St.
1934. Biddle, Sydney Geoffrey, 255 S. 17th St.
1918. Billings, Arthur E., 2020 Spruce St.
1917. Birdsall, Joseph C., 139 Booth Lane, Haverford, Pa.
1933. Bishop, Paul A., Pennsylvania Hospital.
1944. Blady, John V., 222 Meeting House La., Merion, Pa.
1917. Block, Frank B., 136 S. 16th St.
1929. Bockus, Henry L., 250 S. 18th St.
1928. Boles, Russell S., Rittenhouse Plaza.
1923. Bond, Earl D., 111 N. 49th St.
1911. Bonney, Charles W., 255 S. 17th St.
1924. Boon, David J., 1532 N. 15th St.
1931. *Bortz, Edward Le Roy.
1921. Borzell, Francis Frank, 4940 Penn St., Frankford.
1936. Bostwick, Delazon Swift, 106 Linwood Ave., Ardmore, Pa.
1928. Bothe, Albert E., 255 S. 17th St.
1928. Bothe, Frederick A., 255 S. 17 St.
1923. Bower, John O., 2008 Walnut St.
1942. Bowie, Morris A., 910 Old Lancaster Road, Bryn Mawr, Pa.
1907. Boyer, Henry P., 4602 Baltimore Ave.
1925. Boykin, Irvine M., 136 S. 16th St.
1929. Bradbury, Samuel, 151 W. Coulter St.
1907. Bradley, William Nathaniel, 1725 Pine St.
1942. Branen, William, Whitby & Cypress Ave., Yeadon, Pa.
1921. Bransfield, John W., 2101 Spruce St.
1917. Bromer, Ralph S., 318 Milbank Road, Bryn Mawr, Pa.
1936. Brown, Charles L., 325 N. Bowman Ave., Merion, Pa.
1932. Brown, Claude P., 1930 Chestnut St.
1919. *Brown, Henry P., Jr.
1939. Brust, Raymond W., 4710 Chester Ave.
1930. Bucher, Carl Joseph, The Westbury, 15th & Spruce Sts.
1943. Buerki, Robin C., University of Pa.
1928. Burden, Verne G., 255 S. 17th St.
1940. Burnett, W. Emory, 3401 N. Broad St.
1941. Butler, Miriam, 1831 Chestnut St.
1906. Butler, Ralph, 1930 Chestnut St.
1907. Cadwalader, Williams B., 133 S. 36th St.
1928. *Campbell, Edward H.
1944. Campion, Richard J., Penllyn Rd., Springhouse, Ambler, Pa.
1931. Cantarow, Abraham, 2033 Delancey St.
1935. Carey, Lawrence S., 1930 Chestnut St.
1931. Cariss, Walter L., 2043 Walnut St.
1930. Carpenter, Chapin, 1930 Chestnut St.
1905. Carpenter, Herbert B., 1805 Spruce St.
1926. Carpenter, Howard Childs, 1805 Spruce St.
1895. Carpenter, John T., 1930 Chestnut St.

* On active service.

1917. Carson, John B., 1802 Pine St.
1922. Case, Eugene A., 63 W. La Crosse Ave., Landsdowne, Pa.
1937. Castallo, Mario A., 1621 Spruce St.
1943. Castigliano, S. Gordon, 1012 Hampstead Rd., Penfield Downs, Del. Co., Pa.
1933. Chamberlain, W. Edward, Temple University Hospital.
1939. Chamberlain, George W., Reading Hospital, Reading, Pa.
1900. Chance, Burton, 317 S. 15th St.
1939. Charr, Robert Kyun Hyun, 2038 Locust St.
1941. *Cheleden, John.
1939. Ciccone, Emmet F., 2021 Murray St.
1929. Clark, Eliot R., 315 S. 41st St.
1934. Clark, Jefferson Hamer, 3701 N. Broad St.
1926. Clerf, Louis H., 1530 Locust St.
1910. Cloud, J. Howard, 11 W. Montgomery Ave., Ardmore, Pa.
1903. Coates, George Morrison, 1721 Pine St.
1908. Codman, Charles A. E., S.E. Corner 42d and Spruce Sts.
1941. *Cohen, J. Gershon.
1907. Cohen, Myer Solis-, 2110 Spruce St.
1888. Cohen, S. Solis-, 1906 Walnut St.
1920. Cole, Charles J., 7926 Park Ave., Elkins Park, Pa.
1934. Colgan, Robert C., 5882 No. Marshall St.
1934. *Collins, Leon Howard, Jr.
1943. Colonna, Paul C., Univ. of Pa. Hospital.
1939. Comroe, Bernard I., 1726 Pine St.
1930. Cooper, David A., 1520 Spruce St.
1941. *Cornelius, Chalmers E.
1911. Cornell, Walter S., Board of Public Education, Parkway and 21st St.
1914. Corson, Edward F., 136 S. 16th St.
1930. *Cottrell, James E.
1924. Cowan, Alfred, 1930 Chestnut St.
1940. *Cowan, Thomas H.
1904. Craig, Frank A., The Henry Phipps Institute, 7th and Lombard Sts.
1942. *Craighill, Margaret D.
1907. Crampton, George S., 2031 Locust St.
1937. *Crane, Martin P.
1920. Creighton, William J., 37 S. 20th St.
1941. Creskoff, Adolph J., 3400 Spruce St.
1920. Cross, George H., Chester, Pa.
1917. Cross, Sumner H., P. O. Box 126, Jenkintown, Pa.
1921. *Crossan, Edward T.
1940. Croe, Aldrich C., 735 Atlantic Ave., Ocean City, N. J.
1904. Cruwce, John M., 407 S. 22d St.
1937. Cruimp, Jean, 1930 Chestnut St.
1937. Curtis, Lawrence, 255 S. 17th St.
1934. *Custer, R. Philip.
1941. *Cuttle, Tracy D.
1938. Dannenberg, Arthur M., 235 S. 15th St.
1919. Davies, John R., Jr., 2 E. Chestnut Ave., Chestnut Hill.
1936. Davis, David M., 255 S. 17th St.
1937. *Davis, Perk Lee.
1916. Davis, Warren Beagle, 135 S. 18th St.

* On active service.

1935. *Deaver, J. Montgomery.
1902. Dehoney, Howard, 240 S. 13th St.
1935. Deibert, Irvin Elmer, 538 Cooper St., Camden, N. J.
1924. Deichler, L. Waller, 1930 Chestnut St.
1923. De Long, Perce, N. E. Cor. 20th and Chestnut Sts.
1928. Dewees, A. Lovett, Times Medical Bldg., Ardmore, Pa.
1924. Dillon, Edward S., 2016 DeLancey St.
1932. Dintenfass, Henry, 1305 Spruce St.
1920. Diven, John, 1827 Delancey St.
1941. *Dixon, Harold M.
1920. Doane, Joseph C., 19th and Spruce Sts.
1942. Donnelly, Edward J., 1721 W. Girard Ave.
1933. Donnelly, Joseph C., 255 S. 17th St.
1937. Donnelly, Robert T. M., 255 S. 17th St.
1907. Dorrance, George M., 2101 Spruce St.
1933. *Downs, T. McKean.
1910. Drayton, William, Jr., 2028 Delancey St.
1935. Duane, William, Jr., 1928 Delancey St.
1944. Dublin, George J., 1930 Chestnut St.
1944. Dugger, John H., 3902 Vaux St.
1935. *Duncan, Garfield G.
1937. Dunn, Charles W., 269 S. 19th St.
1942. Durant, Thomas M., Broad and Ontario Sts.
1942. Dyer, W. Wallace, 2016 Delancey St.
1935. *Eads, John T.
1911. Earnshaw, Henry C. Bryn Mawr, Pa.
1936. Easby, Mary Hoskins, 1930 Chestnut St.
1937. Edeiken, Joseph, 1832 Spruce St.
1944. Eger, Sherman A., 2029 Delancey St.
1944. Ehrich, William E., 236 W. Hortter St.
1930. Eiman, John, Cynwyd, Pa.
1911. Eliason, Eldridge L., 326 S. 19th St.
1939. Ellis, Van Mashburn, 1530 Locust St.
1928. Ellison Richard T., 269 S. 19th St.
1936. *Ellson, J. Vernon.
1904. Elmer, Walter G., 1801 Pine St.
1937. *Elsom, Kendall A.
1934. Ely, William C., 3912 Chestnut St.
1932. Engel, Gilson G., 255 S. 17th St.
1942. Erb, William H., 4 Morton Ave., Ridley Park, Pa.
1893. Eshner, Augustus A., 1019 Spruce St.
1944. Estes, William L., Jr., Bethlehem, Pa.
1905. Evans, William, 500 W. Gay St., West Chester, Pa.
1922. Farley, David L., 4429 Larchwood Ave.
1903. Farr, Clifford B., Bryn Mawr, Pa.
1930. Farrell, John T. Jr., 255 S. 17th St.
1935. *Ferguson, Lewis Kraeer.
1936. *Fetter, Ferdinand.
1935. Fetter, Theodore R., 255 S. 17th St.
1924. Fewell, Alexander G., 1924 Pine St.
1943. Finkelstein, Arthur, 645 Overhill Rd., Ardmore, Pa.

* On active service.

1928. *Fitz-Hugh, Thomas, Jr.
1928. *Flick, John B.
1939. Flippin, Harrison F., 255 S. 17th St.
1940. *Forrester, James S.
1941. Fox, C. Calvin, 1806 Spruce St.
1906. Fraley, Frederick, 71st and City Line, Overbrook, Pa.
1941. *Frazier, William Doane.
1939. *Freeman, Norman E.
1935. Fridy, Cyrus Ward, 322 Riverview Ave., Drexel Hill, Pa.
1942. Friedman, Reuben, 877 N. 6th St.
1933. Fritch, James Scott, 269 S. 19th St.
1937. *Fritz, Herbert H.
1940. *Fry, Kenneth E.
1935. Fry, Wilfred Eyles, 1819 Chestnut St.
1937. Furlong, Thomas F., Jr., Times Medical Building, Armore, Pa.
1935. Gammon, Geo. D., Univ. of Pa. Hospital.
1931. Garner, Vaughn C., Germantown Professional Building.
1935. *Geist, Donald C.
1917. Gerhard, Arthur H., 1615 N. Delaware Ave.
1899. Gibbon, John H., Media, Pa.
1934. *Gibbon, John H., Jr.
1939. Gibson, Glen Gregory, 255 S. 17th St.
1944. Gifford, Edward S., Jr., 1913 Spruce St.
1933. Gifford, U. Grant, Kennett Square, Pa.
1920. Gill, A. Bruce, 1930 Chestnut St.
1931. *Gilman, Robert Louis.
1927. Gilmour, William R., 413–14 Weightman Bldg., 1524 Chestnut St.
1931. Giordano, Anthony A. S., 1819 S. Broad St.
1906. Gittings, John C., Harwood, Md.
1906. Goepp, R. Max, 1333 Chestnut St.
1933. Goldburgh, Harold L., 1932 Spruce St.
1935. Goldsmith, N. Ralph, 136 S. 16th St.
1905. Gordon, Alfred, 1520 Spruce St.
1928. *Gordon, Burgess L.
1937. Gordon, William, 1721 Pine St.
1941. *Gouterman, Joseph I.
1894. Graham, Edwin E., 1713 Spruce St.
1926. Grant, Francis Clark, Univ. of Pa. Hospital.
1933. Greenbaum, Sigmund S., 320 S. 18th St.
1940. Greene, Lloyd B., 136 S. 16 St.
1932. *Griffith, George C.
1934. Griffith, John Q., Jr., 214 Glencoe Ave., Upper Darby, Pa.
1941. *Groff, Robert A.
1933. Gruber, Charles M., Jefferson Medical College.
1932. Guequierre, Jacques P., Mermont Plaza, Bryn Mawr, Pa.
1944. Gunter, John H., 1306 Knox Rd., Wynnewood, Pa.
1935. Hadden, Samuel B., 37 S. 20th St.
1935. *Haines, Harlan F.
1939. Hamblock, Leonard C., 255 So. 17th St.
1894. Hamill, S. McC., 1822 Spruce St.
1897. Hand, Alfred, 1724 Pine St.

* On active service.

1938. *Hand, John G.
1932. Harris, Stanley E., Lansdowne, Pa.
1929. Harrison, Francis G., 1900 Spruce St.
1933. Harrison, William John, 135 S. 17th St.
1903. Hart, Charles D., 420 W. Mermaid Lane, Chestnut Hill.
1941. Hartley, Harriet L., 1719 Rittenhouse Square.
1932. Hartman, J. Calvin, 100 W. Walnut Lane.
1926. Hartmann, Fred L., 1914 Pine St.
1935. Haskell, Benjamin F., 1426 Spruce St.
1907. Hatfield, Charles James, Henry Phipps Institute, 7th and Lombard Sts.
1911. Heed, Charles R., 1205 Spruce St.
1944. Herbut, Peter A., Jefferson Medical College Hospital.
1927. Herman, Leon, 136 S. 16 St.
1944. Hershey, J. Ivan, 152 Pennsylvania Ave., Bryn Mawr, Pa.
1924. Hewson, William, 2031 Locust St.
1924. Hirst, John C., 2d, 500 N. 20th St.
1944. Hirst, Otto C., 255 S. 17th St.
1908. Hitchens, Arthur Parker, Medical School, Univ. of Pa.
1943. Hitschler, William J., 8840 Germantown Ave.
1944. Hneleski, Ignatius S., Phila. General Hosp.
1943. Hockaday, Agnes, 316 Shadeland Ave., Drexel Hill, Pa.
1939. *Hodes, Philip J.
1905. Hodge, Edward B., 2019 Spruce St.
1931. Holland, H. Albert, 8200 Crittenden St., Chestnut Hill.
1933. Hollingshead, Irving W., 123 S. 18th St.
1932. Hollingsworth, I. Pemberton P., 411 N. Walnut St., West Chester, Pa.
1919. Hopkins, Arthur H., 1726 Pine St.
1925. Hopkinson, R. Dale, Jenkintown, Pa.
1944. Housel, Edmund L., 255 S. 17th St.
1928. Houser, Karl Musser, 2010 Spruce St.
1938. Howell, John Carnett, 326 S. 19th St.
1937. *Hughes, Joseph.
1939. Hughes, P. Boland, 419 Hillbrook Rd., Bryn Mawr, Pa.
1923. Hume, John E., N.E. Corner 20th and Chestnut Sts.
1921. *Hunter, Robert John.
1926. Husik, David N., 1820 Spruce St.
1934. Hustead, Frank H., 5112 N. Broad St.
1935. Ingleby, Helen, Woman's Medical College.
1921. Ivy, Robert H., 1930 Chestnut St.
1917. Jackson, Chevalier, 255 S. 17th St.
1932. Jackson, Chevalier L., 255 S. 17th St.
1934. Jacobs, Maurice S., 1831 De Lancey Place.
1941. *Jeffers, William A.
1913. Jeffreys, William H., 143 Gray's Lane, Haverford, Pa.
1928. John, Rutherford L., 256 S. 21st St.
1942. *Johnson, Julian.
1938. *Johnson, Thomas A.
1918. Jonas, Leon, 255 S. 17th St.
1943. *Jones, Charles Alexander.
1924. Jones, Harold W., 1930 Chestnut St.
1900 Judson, Charles F., 252 Kent Road, Wynnewood, Pa.

* On active service.

1902. Jump, Henry Draper, 1530 Locust St.
1936. Kain, Thomas M., 403 Cooper St., Camden, N. J.
1938. Kasper, Kelvin A., 135 S. 18th St.
1941. Kauffman, M. Luther, Medical Arts Bldg., Jenkintown, Pa.
1938. Keeler, Harold R., 1824 Spruce St.
1935. Kelley, George F. J., N.E. Cor. 20th and Chestnut Sts.
1932. Kelly, Herbert T., 1900 Spruce St.
1912. Kelly, Thomas C., 105 School Lane.
1941. Kennedy, Patrick J., 6910 Market St., Upper Darby, Pa.
1921. *Kern, Richard A.
1935. *Keyes, Baldwin L.
1930. *Kimbrough, Robert A., Jr.
1936. *King, Orville C.
1920. Klauder, Joseph V., 1934 Spruce St.
1920. Klein, Thomas, 250 S. 18th St.
1934. *Klemmer, Roland N.
1934. Kline, Oram R., 414 Cooper St., Camden, N. J.
1932. Klopp, John W., 618 W. Lehigh Ave.
1943. Kneedler, William H., 8801 Crefeld St.
1919. Knipe, Norman L., 1930 Chestnut St.
1908. Knowles, Frank C., 2035 Spruce St.
1938. Knox, Andrew, 1930 Chestnut St.
1925. Knox, Harry E., 719 66th Ave., Oak Lane.
1914. Kolmer, John A., Cynwyd, Pa.
1936. Konzelmann, Frank Williamson, 3638 N. 21st St.
1941. *Krall, J. Thomas.
1941. Krewson, William E., 3rd, 1930 Chestnut St.
1914. Krumbhaar, Edward B., School of Medicine, Univ. of Pa.
1944. LaMotte, William O., Medical Arts Bldg., Wilmington, Del.
1907. Langdon, H. Maxwell, 1530 Locust St.
1933. Langdon, Roy L., 5917 Greene St., Germantown.
1941. *Langner, Paul H., Jr.
1934. *Laplace, Louis B.
1926. Laws, George M., 1907 Spruce St.
1936. Leaman, William G., 3700 Baring St.
1920. Leavitt, Frederic Headley, 1527 Pine St.
1941. *Leberman, Paul R.
1934. Lee, Thomas B., 622 Cooper St., Camden, N. J.
1908. Lee, Walter Estell, 1833 Pine St.
1942. Lehman, James A., 1815 Spruce St.
1936. Lehrfeld, Louis, 1321 Spruce St.
1944. Lell, William A., 203 W. Chestnut Ave., Chestnut Hill.
1935 Lemmon, William T., 1930 Chestnut St.
1943. Leopold, Irving H., Univ. of Pa. Hospital.
1920. Leopold, Simon S., 2025 Spruce St.
1944. Lettiere, Anthony J., 425 E. State St., Trenton, N. J.
1933. Levering, J. Walter, Abington Memorial Hospital, Abington, Pa.
1915. Lewis, Fielding O., Providence Road, Media, Pa.
1938. *Lewis, James P.
1936. Lillie, Walter I., 255 S. 17th St.
1940. *Limberger, William A.

* On active service.

1938. *Lindauer, M. August.
1927. Lindsey, Walter H., 810 W. Dauphin St.
1936. Lintgen, Charles, 1930 Chestnut St.
1944. Livezey, Mary M., 7200 Cresheim Rd.
1936. Llewellyn, Thomas H., 739 N. 40th St.
1907. Lodholz, Edward, Medical Laboratories, Univ. of Pa.
1931. Loewenberg, Samuel A., 1905 Spruce St.
1938. Long, Charles-Francis, 1836 Delancey St.
1933. *Long, Esmond R.
1935. Long, William L., 2025 Walnut St.
1893. Longaker, Daniel, 5702 Overbrook Ave.
1931. Longaker, Edwin P., 41 E. Montgomery Ave., Ardmore, Pa.
1944. Loudenslager, Paul E., 2101 Spruce St.
1942. Lownes, John B., 136 S. 16th St.
1936. *Lucchesi, Pascal Francis.
1921. *Lucké, Balduin H. E.
1932. Lukens, Francis D. W., Cynwyd, Pa.
1938. Lukens, Philip Jefferson, Jr., 158 E. Butler Ave., Ambler, Pa.
1930. Lukens, Robert M., Medical Arts Bldg., 16th and Walnut Sts.
1929. Lull, Clifford, B., Women's Bldg., Penna. Hosp., 807 Spruce St.
1939. Luongo, Romeo A., 2054 Locust St.
1919. Lynch, Frank B., Jr., Germantown Hosp., Penn and Chew Sts.
1914. Lyon, B. B. Vincent, 1930 Chestnut St.
1933. McAndrews, Leo F., Mermont Plaza, Bryn Mawr, Pa.
1932. McCahey, James F., 1534 Pine St.
1900. McCarthy, Daniel J., 2025 Walnut St.
1936. McCarthy, Patrick A., Central Medical Bldg.
1935. *McClenahan, William U.
1931. McCloskey, Edward, 7 E. Chestnut Ave., Chestnut Hill.
1942. McCloskey, John F., 8720 Germantown Ave.
1935. McConnell, James W., 20th and Chestnut Sts.
1934. McCouch, Grayson P., Medical School, Univ. of Pa.
1938. McCrea, Lowrain E., 1930 Chestnut St.
1937. McCutcheon, Morton, Alden Park Manor, Germantown.
1942. *McDonald, P. Robb.
1895. McFarland, Joseph, 542 W. Hortter St., Germantown.
1937. *McGuinness, Aims C.
1940. *McLaughlin, Edward F.
1933. *McLaughlin, James S.
1924. McMillan, Thomas M., 2044 Locust St.
1924. McPhedran, F. Maurice, Germantown Hosp., Penn and Chew Sts.
1943. Macfarlan, Douglas, 1805 Chestnut St.
1932. Macfarlane, Catharine, 136 S. 16 St.
1936. MacMurtrie, Wm. J., 912 S. 49th St.
1939. Macneill, Norman N., 5807 Chew St.
1935. Maeder, LeRoy, 204 S. 13th St.
1935. Maier, Ernest G., 1323 N. 15th St.
1914. Maier, F. Hurst, Wood-Norton Apts., Johnson and Wayne, Germantown.
1942. *Manges, Lewis C., Jr.
1936. Mann, Bernard, 2019 Pine St.
1937. Margolies, Alexander, 1836 Delancey St.

* On active service.

1941. Martin, James R., 136 S. 16 St.
1935. *Mason, James B.
1935 Matthews, Robert A., 111 N. 49th St.
1939. May, Hans, 5501 Greene St.
1932. *Meade, Richard H., Jr.
1934. *Mecray, Paul M.
1914. Mencke, J. Bernhard, 1816 Spruce St.
1941. *Mendell, Theodore H.
1943. Meranze, David R., 1031 Lakeside Ave.
1937. Meyer, George Phillip, 410 Haddon Ave., Camden, N. J.
1935. Miller, Ford A., 4016 Chestnut St.
1944. Miller, Henry A., 2009 Pine St.
1934. Miller, Hugh McCauley, 1614 Locust St.
1939. Miller, Malcolm W., 2021 W. Girard Ave.
1939. Miller, Merle M., 6013 Greene St.
1932. Miller, M. Valentine, 114 W. Phil-Ellena St.
1921. Miller, T. Grier, Univ. of Pa. Hospital.
1937. Missett, Joseph Vincent, Jr., 1814 Spruce St.
1904. Mitchell, Charles Franklin, 2003 Pine St.
1932. Mohler, Roy W., 1806 Spruce St.
1936. *Montgomery, Hugh.
1936. Montgomery, John B., 1930 Chestnut St.
1932. Montgomery, Thaddeus L., 2031 Locust St.
1928. Moon, Virgil H., Jefferson Medical College.
1935. Moore, John Royal, Beury Bldg., Broad St. and Erie Ave.
1924. Moorhead, Stirling W., 1523 Pine St.
1936. *Morgan, David R.
1893. Morris, Elliston J., 439 Midland Ave., St. Davids, Del. Co., Pa.
1944. Morris, Harold H., Villa Nova, Pa.
1941. *Mucklé, Craig Wright.
1929. Mudd, Stuart, Department of Bacteriology, Medical School, Univ. of Pa.
1935. Mullen, Carroll Richard, 2025 Locust St.
1934. *Mullen, Edward A.
1905. Muller, George P., 1930 Spruce St.
1930. Murphy, Douglas P., University Hospital.
1934. Murphy, Eugene C., 1841 S. Broad St.
1905. Mutschler, Louis H., 1625 Spruce St.
1936. Nelson, Guy M., 255 S. 17th St.
1943. Nelson, Waldo E., 615 Moreno Rd., Narberth, Pa.
1905. Newcomet, William S., 3501 Baring St.
1938. Newton, Zachariah B., 601 E. Sedgwick St.
1935. *Nicholson, Jesse Thompson.
1899. Nicholson, William Rufus, 1930 Chestnut St.
1941. Nisbet, Verner, 254 S. 45th St.
1905. Norris, Charles C., Darby and Goshen Roads, Bryn Mawr, Pa.
1938. *Norris, Robert F.
1941. *North, John Paul.
1933. Nylin, Josef B., Univ. of Pa. Hospital.
1941. Odenatt, Wm. Burrill, 1213 W. Lehigh Ave.
1913. O'Neal, Alexander Hay, St. Davids, Pa.
1936. *Orr, Theodore E.

* On active service.

1913. Outerbridge, George W., 1927 Spruce St.
1915. Owen, Hubley R., 319 S. 16th St.
1897. Packard, Francis R., 304 S. 19th St.
1933. Palmer, Harold Dean, 111 N. 49th St.
1909. Parish, Benjamin Dores, 1927 Spruce St.
1940. *Parker, Alan P.
1944. Paschkis, Karl E., Jefferson Medical College.
1931. Paul, John Davis, 3112 N. Broad St.
1932. Payne, Franklin L., Univ. of Pa. Hospital.
1943. Pearson, Gerald H., 111 N. 49th St.
1922. Pelouze, P. S., 1737 Chestnut St.
1909. Pemberton, Ralph, Paoli, Pa.
1930. Pendergrass, Eugene P., Univ. of Pa. Hospital.
1932. Pennell, Howard Y., West Chester, Pa.
1944. *Pennypacker, Charles S.
1939. *Pepper, D. Sergeant.
1914. Pepper, O. H. Perry, Univ. of Pa. Hospital.
1902. Pepper, William, School of Medicine, Univ. of Pa.
1916. Percival, Milton Fraser, 2332 S. Broad St.
1942. Perkins, William Harvey, 1025 Walnut St.
1940. Pessel, Johannes F., 224 West State St., Trenton, N. J.
1937. *Pettit, Horace.
1905. Pfahler, George E., 1930 Chestnut St.
1915. Pfeiffer, Damon B., Meadowbrook, Pa.
1935. Phillips, Arthur W., 3904 Walnut St.
1911. Piersol, George Morris, Univ. of Pa. Hospital.
1933. *Pillsbury, Donald M.
1922. Pleasants, Henry, Jr., West Chester, Pa.
1937. Polk, David Stewart, Rosemont, Pa.
1932. Porter, Roland De Lance, Jenkintown, Pa.
1931. Pryor, Charles Allen, 1910 Spruce St.
1943. *Radbill, Samuel X.
1931. Ramsey, Frank M., Chestnut Hill.
1913. Randall, Alexander, 136 S. 16 Street.
1941. Rankin, Charles A., Ludlow & Heather Rd., Upper Darby, Pa.
1926. *Ravdin, I. S.
1941. Rea, Marion Hague, 141 Montgomery Ave., Bala-Cynwyd, Pa.
1938. *Read, Hilton Shreve.
1928. Reese, Warren S., 1901 Walnut St.
1925. Reeves, Rufus S., 2227 Spruce St.
1931. Regester, Robert P., 255 S. 17th St.
1920. Rehfuss, Martin E., 131 St. George's Rd., Ardmore, Pa.
1921. Reiff, E. Paul, 1927 Spruce St.
1937. Reimann, Hobert A., Jefferson Hospital.
1919. Reimann, Stanley P., The Lankenau Hospital Research Institute, Girard and Corinthian Aves.
1929. de Rényi, George S., 212 S. 39th St.
1923. Repplier, Sidney J., 373 Roumfort Rd., Mt. Airy.
1936. Richards, James L., Haverford Villa, Ardmore, Pa.
1919. Richardson, Russell, 320 S. 16th St.
1919. Ridpath, Robert F., 1737 Chestnut St.
1942. Riggs, Helena E., 37 S. 20th St.

* On active service.

1936. Ritter, Joseph A., 2405 N. 54th St.
1933. de Rivas, Damaso, 1831 Chestnut St.
1942. Rivers, Thurston D., 111 N. 49th St.
1932. *Robbins, Frederick R.
1939. Roberts, Ella, 133 S. 36th St.
1944. Roberts, Joseph E., 403 Cooper St., Camden, N. J.
1899. Roberts, Walter, 1921 Spruce St.
1932. *Robertson, Harold F.
1903. Robertson, William Egbert, 327 S. 17th St.
1938. Roche, Philip Q., 255 S. 17th St.
1912. Rodman, John Stewart, 1726 Spruce St.
1934. Rogers, Harry L., Riverton, N. J.
1928. Rose, Edward, Univ. of Pa. Hospital.
1936. Rose Elizabeth Kirk, 426 Owen Rd., Wynnewood, Pa.
1932. Rothrock, Harry A., West Chester, Pa.
1936. Rothschild, Norman, 245 S. 16th St.
1933. *Rowntree, Leonard George.
1937. Roxby, John B., R.D. 1, Souderton, Pa.
1941. *Royster, Hubert A., Jr.
1943. Rubin, Mitchell I., 1740 Bainbridge St.
1933. Rudolphy, Jay Besson, 230 S. 21st St.
1929. Ryan, William J., 136 S. 16th St.
1944. Sampson, David Alan, Montgomery Court, Narberth, Pa.
1936. Sands, Joseph Evans, Rosemont, Pa.
1905. Sartain, Paul J., 2006 Walnut St.
1908. Sautter, Albert C., Germantown Professional Bldg.
1920. Scarlett, Hunter W., 230 S. 21st St.
1939. Scattergood, Joseph, Jr., 115 S. High St., West Chester, Pa.
1917. Schaeffer, J. Parsons, 4634 Spruce St.
1929. Scheffey, Lewis C., 255 S. 17th St.
1942. *Scheie, Harold G.
1929. *Schenck, Harry P.
1917. Schnabel, Truman G., 1704 Pine St.
1917. Schoff, Charles H. Media, Pa.
1928. *Schofield, Frederick S.
1921. Schumann, Edward A., 1814 Spruce St.
1930. Scott, John Porter, 1740 Bainbridge St.
1940. *Scott, T. F. McNair.
1924. Shallow, Thomas A., 1611 Spruce St.
1908. Shannon, Charles E. G., 1930 Chestnut St.
1928. Sharpe, John S., Haverford, Pa.
1928. Sharpless, Frederick C., Rosemont, Pa.
1897. Sharpless, William T., West Chester, Pa.
1931. *Sheehan, William C.
1932. Sheridan, Joyce T., 412 W. Durham St.
1943. Shewbrooks, Daniel M., Penn Mutual Life Ins. Co., 6th and Walnut Sts.
1936. Shipman, James Shelby, 255 S. 17th St.
1935. *Shoemaker, Robert, 3rd.
1939. *Shumway, Norman P.
1936. Shuster, Benjamin H., 1824 Pine St.
1941. *Silcox, Louis E.

* On active service.

1903. Sinclair, John F., 4103 Walnut St.
1907. Sinkler, Francis W., 136 S. 16th St.
1928. Skillern, Samuel R., 1734 Pine St.
1933. Smelzer, Donald Campbell, Germantown Hosp., Penn and Chew Sts.
1929. *Smith, Austin T.
1933. *Smith, Lauren Howe.
1937. Smith, Lawrence Weld, Temple School of Medicine.
1936. Smith, Richard Manges, 4727 Oakland St.
1927. Smyth, Calvin Mason, Room 451, Methodist Hospital, Broad and Wolf Sts.
1938. Snodgrass, L. E., 318 Walnut St.
1941. Snyder, G. Gordon, Mermont Apts., Bryn Mawr, Pa.
1935. Sokoloff, Martin J., 255 S. 17th St., Phila.
1940. Soloff, Louis A., 2032 Pine St.
1935. Sommer, George N. J., 120 W. State St., Trenton, N. J.
1944. *Sommer, George N. J., Jr.
1928. Spaeth, Edmund B., 1930 Chestnut St.
1937. Spangler, John Luther, Devon, Pa.
1935. Spiegel, Ernest, 6807 Lawnton Ave., Oak Lane.
1929. Sponsler, Marshall B., 1737 Chestnut St.
1944. Stadie, William C., University Hospital.
1909. Starbuck, J. Clinton, 42 East Washington St., Media, Pa.
1927. Starr, Isaac, 505 Cresheim Valley Rd.
1936. Steinfield, Edward, N.E. Cor. 18th and Chestnut Sts.
1942. *Stengel, Alfred, Jr.
1914. Stewart, Thomas S., The Barclay, 18th and Rittenhouse Sq.
1941. Stewart, Winifred B., 2028 Delancey St.
1931. *Stiles, Merritt H.
1934. Stimson, Cheney M., 167 Harvey St., Germantown.
1925. Stokes, John H., 4228 Spruce St.
1928. Stokes, Joseph, Jr., 1740 Bainbridge St.
1943. Stokes, S. Emlen, 129 Chester Ave., Moorestown, N. J.
1923. Strecker, Edward A., 111 N. 49th St.
1923. Stroud, William Daniel, 1011 Clinton St.
1937. Strumia, Max M., Bryn Mawr Hospital, Bryn Mawr, Pa.
1933. Stuckert, Harry, 248 S. 21st St.
1937. Sturgis, Margaret C., 1930 Chestnut St.
1927. Sturgis, Samuel Booth, 34 W. Montgomery Ave., Ardmore, Pa.
1934. Summey, Thomas J., 255 S. 17 St.
1930. Sunderman, F. William, 2210 Delancey St.
1936. Surver, James Miller, 1832 Spruce St.
1928. Swartley, William B., 6002 Greene St.
1934. Sweeney, John A., 1900 Rittenhouse Sq.
1944. Swenson, Paul C., Jefferson Hospital.
1943. Tassman, Isaac S., 136 S. 16th St.
1933. Taylor, Herbert W., Haverford, Pa.
1931. Taylor, Norman H., 100 W. Evergreen Ave.
1928. Thomas, J. Earl, Drexel Hill, Pa.
1907. Thomas, T. Turner, 1636 Francis St.
1942. *Thompson, Wesley, D., Jr.
1927. Thorington, J. Monroe, 2031 Chestnut St.
1898. Thornton, Edward Q., 1331 Pine St.

* On active service.

1936. Thornton, Mary Bickings-, 2703 West Somerset St.
1936. Thorp, Francis Quicksall, 4900 Penn St.
1936. Thudium, William J., 136 S. 16 St.
1935. Tocantins, Leandro Maués, 45 Woodale Rd.
1935. Toland, Owen J., Episcopal Hospital, Front and Lehigh Ave.
1941. Tompkins, Pendleton, 807 Spruce St.
1936. Towson, Charles Emory, Germantown Professional Bldg.
1908. Tracy, Stephen E., 1930 Chestnut St.
1926. Tucker, Gabriel, 250 S. 18th St.
1938. Tuft, Louis, 1530 Locust St.
1933. Tumen, Henry J., 1900 Rittenhouse Sq.
1938. Turman, Christopher M., Wyncote, Pa.
1923. Turner, Creighton H., 1731 Pine St.
1929. Tyson, Ralph M., 255 S. 17th St.
1937. *Uhle, Charles A. W.
1907. Ullom, Josephus T., Carpenter and Quincy Sts.
1937. *Vander Veer, Joseph B.
1937. Van Loon, Emily Lois, 1930 Chestnut St.
1933. Vastine, Jacob H. 2nd, 136 S. 16 St.
1912. Vaux, Norris Wistar, 807 Spruce St.
1940. Voegelin, Adrian W., Germantown Professional Bldg.
1941. *Vogel, Stoughton R.
1903. Wadsworth, William S., 3914 Baltimore Ave.
1927. Wagers, Arthur J., 1429 Spruce St.
1928. *Wagoner, George W.
1938. *Waldman, Joseph.
1906. Walker, John K., Media, Pa.
1907. Walker, Warren, 1819 Chestnut St.
1932. Walkling, Adolph A., 136 S. 16 St.
1904. Walsh, Joseph, 136 S. 16 St.
1895. Watson, Arthur W., 2013 Locust St.
1932. Watt, Charles C., Jr., 6605 Wayne Ave.
1933. Waygood, James Jamison, 3464 School Lane.
1941. Weaver, Ruth H., 1719 Rittenhouse Square.
1930. Weeder, S. Dana, 6110 Greene St.
1920. Weidman, Fred D., 20 Tenby Rd., Llanerch, Pa.
1933. Weiss, Benjamin P., The Lenox, 13th and Spruce Sts.
1923. Weiss, Edward, 269 S. 19th St.
1935. Whelan, G. L., 2100 Walnut St.
1921. Whitaker, William, 6771 Germantown Ave.
1936. White, Ellen Pawling Corson-, 1820 Pine St.
1925. Widmann, Bernard P., 250 S. 18th St.
1936. Wilder, Theodore S., Germantown Professional Bldg., Greene and Coulter Sts.
1914. Willard, De Forest P., 1726 Spruce St.
1935. *Willard, John Harrington.
1939. Willauer, George, 1930 Chestnut St.
1907. Williams, Carl, School Lane and Greene St.
1924. Williams, Horace James, 5908 Greene St., Germantown.
1937. Williams, John C., 6370 Germantown Ave.
1920. Williams, Philip F., 2206 Locust St.
1927. Williamson, Ernest G., 6353 Woodbine Ave.

* On active service.

1921. Wilson, George, 133 S. 36th St.
1942. Wilson, Lucius R., 1305 Morris Road, Wynnewood, Pa.
1937. Wilson, Ross B., 1820 S. Rittenhouse Sq.
1902. Wilson, Samuel M., 1930 Chestnut St.
1940. *Winchell, A. Vaughn.
1941. *Wirts, C. Wilmer.
1904. Wister, James W., 5430 Germantown Ave.
1933. Wohl, Michael G., 1727 Pine St.
1944. Wolf, Lewis R., 3474 Frankford Ave.
1918. Wolferth, Charles C., 26 Raynham Rd., Merion, Pa.
1942. *Wolman, Irving J.
1893. Wood, Alfred C., 2035 Walnut St.
1932. *Wood, Francis C.
1900. Wood, George B., N.E. Corner 20th and Chestnut Sts.
1903. Wood, Horatio C., 319 S. 41st St.
1944. Wood, H. Curtis, Jr., Skippack Pk., Whitemarsh, Pa.
1897. Woodward, George, W. Willow Grove Ave., Chestnut Hill.
1928. Wright, Carroll S., 1402 Spruce St.
1937. Yaskin, Joseph C., 1832 Spruce St.
1943. Yawger, Nathaniel S., 1524 Chestnut St.
1941. Young, Barton R., Temple University Hosp.
1894. Zentmayer, William, 1930 Chestnut St.
1933. Zulick, J. Donald, Abington Memorial Hospital, Abington, Pa.

Non-Resident Fellows

ELECTED

1903. Biggs, M. H., Rutherfordton, N. C.
1937. *Braceland, Francis J.
1936. Brown, Clark E., Dept. Pathology, University of N. Carolina, Chapel Hill, N. C.
1908. Cadbury, William W., Friends Hospital for Mental and Nervous Diseases, Phila., Pa.
1936. Camero, Anthony R., 657 S. Westlake Ave., Los Angeles, Cal.
1936. Clarke, Francis Mann, 116 New St., New Brunswick, N. J.
1937. Conaway, W. P., 1723 Pacific Ave., Atlantic City, N. J.
1936. *Cooper, Melbourne J.
1897. Dorland, W. A. Newman, 1236 N. Dearborn Parkway, Chicago, Ill.
1905. Evans, Joseph S., Jr., 1300 University Ave., Madison, Wis.
1933. Fowler, Kenneth, 2535 Horton Ave., San Diego, Cal.
1935. Fretz, John Edgar, "Hillcrest" College Hill, Easton, Pa.
1913. Gates, Nathaniel, 10 Peterboro, Detroit, Mich.
1936. Guthrie, Donald, 118 S. Wilbur Ave., Sayre, Pa.
1902. Gwyn, Norman B., 109 Madison Ave., Toronto, Canada.
1936. Hatch, Lerleen Clement, 747 Ardmore Ave., Akron, O.
1928. *Hayman, Joseph Marchant, Jr.
1892. Hinsdale, Guy, % The Postern, Brierwood La., Summerville, S. C.
1933. Hitzrot, Lewis H., Medical Director, Mercersburg Academy, Mercersburg, Pa.
1936. Hughes, Brady A., 5005 42d Place, North, Birmingham, Ala.
1899. Jopson, John H., Pawley's Island, S. C.
1931. Kinney, Willard H., 7300 Atlantic Ave., Ventnor, N. J.
1941. Lockwood, John S., Hamden, Conn.
1935. McGuire, Hunter H., 105 N. Braddock St., Winchester, Va.

* On active service.

1900. McReynolds, Robert Phillips, 213 S. Broadway, Los Angeles, Cal.
1936. *Middleton, William Shainline.
1915. Musser, John H., 1430 Tulane Ave., New Orleans, La.
1937. Nicholson, Samuel T., 2d, The Hill School, Pottstown, Pa.
1905. Norris, George W., Dimock, Pa.
1926. Paul, John Rodman, Dept. Internal Medicine, Yale University, New Haven, Conn.
1907. Price, George E., Stimson Bldg., Seattle, Wash.
1904. Ravenel, M. P., 203 Westmount Ave., Columbia, Mo.
1936. *Reisinger, John A.
1907. Royer, B. Franklin, The Hall, R. D. 7, Chambersburg, Pa.
1913. de Schweinitz, George L., 85 E. Broad St., Bethlehem, Pa.
1941. *Shands, Alfred R., Jr.
1932. Siegel, Alvin Erdreich, Medical Arts Building, Macon, Ga.
1934. *Stewart, Sloan G.
1900. Swan, John M., 457 Park Ave., Rochester, N. Y.
1930. Thorpe, Edward S., Jr., Medical Director, St. Paul's School, Concord, N. H.
1913. Vail, William Penn, Blairstown, N. J.
1897. Veasey, Clarence Archibald, 1569 Paulsen Medical and Dental Bldg., Spokane, Washington.
1931. Walker, Herschel Carey, 320 Park Ave., New York City, N. Y.
1903. Weber, Charles H., 3 Arch Bay, Laguna Beach, California.

Honorary Fellows

Limited to Fifty, of Whom Twenty May be Foreigners

American

ELECTED

1917. Miner, Charles Howard, B.S., M.D., Member of Board of Directors, Wilkes-Barre General Hospital; Board of Health, Wilkes-Barre; Board of Directors, White Haven Sanitarium Association and Penna. Tuberculosis Society. 264 S. Franklin St., Wilkes-Barre, Pa.
1936. Richards, Alfred Newton, PH.D., SC.D., M.D. (HON.), L.L.D., Professor of Pharmacology, School of Medicine, Vice-president in charge of Medical Affairs, Univ. of Pa. School of Medicine, Univ. of Pa., Phila.
1942. Russell, Frederick Fuller, M.D., Brig. Gen. Med. Corps, U. S. A. (Ret.). Harvard Medical School, Boston, Mass.

Foreign

1928. Archibald, Edward, M.D., Col., R.C.A., M.C., H. O. Med. Services, Elgin Bldg., Ottawa, Ontario.
1937. Dale, Sir Henry Hallett, C.B.E., F.R.S., M.A., M.D., F.R.C.P., Director, National Institute for Medical Research, Hampstead, Eng. Mt. Vernon House, N.W. 3, Hampstead, London.
1924. Hopkins, Sir F. Gowland, M.D., Biochemical Department, University of Cambridge, Cambridge, England.
1922. McCarrison, Sir Robert, K.T., C.I.E., M.D., D.SC., LL.D., F.R.C.P., Major-General, Indian Medical Service (retired). 18 Linton Rd., Oxford, England.

Honorary Associates

1942. Conklin, Professor Edwin G., Princeton University, Princeton, N. J.
1942. Donner, William Henry, Lincoln-Liberty Bldg., Philadelphia, Pa.

* On active service.

Necrological List

Resident Fellows

	Date of Election	*Date of Death*
James A. Babbitt	April, 1906	October 15, 1944
Edward Warren Beach	March, 1938	April 29, 1944
Stillwell C. Burns	February, 1906	November 2, 1944
B. Franklin Buzby	January, 1934	October 22, 1944
Walter Chrystie	May, 1903	December 9, 1944
William E. Hughes	November, 1892	March 16, 1944
Walter Hughson	May, 1937	September 13, 1944
James Kay	January, 1923	April 21, 1944
James A. Kelly	November, 1909	March 7, 1944
Karl Kornblum	January, 1932	May 16, 1944
Frederick H. Krauss	May, 1904	October 9, 1944
John B. Ludy	January, 1924	September 11, 1944
Paul J. Sartain	June, 1905	April 9, 1944
B. Franklin Stahl	November, 1894	March 20, 1944
Arthur A. Stevens	November, 1901	June 10, 1944
William G. Turnbull	October, 1935	March 11, 1944
George A. Ulrich	January, 1934	July 18, 1944
W. Reynolds Wilson	March, 1897	December 19, 1944

Non-Resident Fellows

	Date of Election	*Date of Death*
William E. Parke	November, 1899	June 26, 1944

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Rolleston, Sir Humphry	March, 1928	September 24, 1944

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